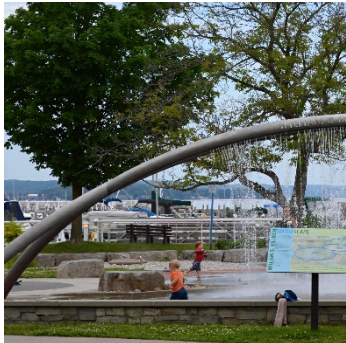
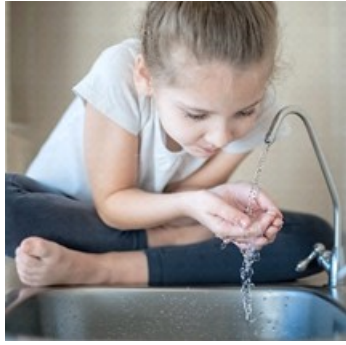




CITY of
TRAVERSE CITY MICHIGAN

DWSRF PROJECT PLAN



PREPARED BY:

MAY 2021



HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

**1925 Breton Road SE, Suite 100
Grand Rapids, Michigan 49506**

HRC Job Number 20210137

Versions:

Draft May 6, 2021 (Submittal to EGLE)

Draft May 21, 2021 (Submittal to Public)

Final #####

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Appendix G: Public Participation Documentation
Appendix H: Project Business Cases
Appendix I: 2020 Water System Reliability Study

1 Executive Summary

1.1 Summary

This Project Plan was prepared for the City of Traverse City to address Water Treatment Plant (WTP) deficiencies and aging facilities. This Project Plan, as prepared by Hubbell, Roth & Clark, describes the existing condition of various Drinking Water Distribution System components and the City's WTP with alternatives to meet those needs and the most cost-effective alternative.

The Project Plan will be submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) in order to qualify for possible Drinking Water State Revolving Fund (DWSRF) loan assistance. While the rates have not been set yet for FY2022, the rates in 2021 is 1.875% for 20-year loans. The Project Plan has been prepared following the DWSRF Project Plan Preparation Guidance Outline administered by The Office of Drinking Water and Municipal Assistance. These rules call for compliance with the basic Federal Planning Requirements and the National Environmental Policy Act (NEPA). The Project Plan will also serve as the basis for project prioritization and must be submitted to EGLE by July 1, 2021, in order to be considered for funding on the project priority list for the fiscal year 2022. These projects below provide an initial framework for evaluation and assessment.

1.2 Conclusions

The following is a summary of the existing issues identified in the Water Reliability Study and recommended by the City.

- ≡ Water Treatment Plant Improvements
 - WTP Emergency Generator
 - WTP High Service Pump Station Valves
 - WTP Backwash and Surface Wash Pumps
 - WTP Sodium Hypochlorite Storage Tanks and Building
 - WTP Electrical Switchgear Improvements
 - WTP Freight Elevator
 - WTP and Low Service Annual Pump Repair
- ≡ Distribution System Improvements
 - Watermain Replacements (multiple locations throughout City)
 - Wayne Hill Booster Station Improvements

1.3 Recommendations

The City of Traverse City should pass a resolution formally adopting the Project Plan and agree to implement the Drinking Water Distribution System and Water Treatment Plant Improvements outlined herein.

The City should submit this report to EGLE in order to attempt to qualify for a low-interest loan through the DWSRF Loan Program.

2 Project Background

2.1 Summary of Project Need

In an effort to meet various recently revised State requirements, improve system reliability, and address aging infrastructure that has reached its useful life, The City of Traverse City is proposing various projects within their Drinking Water Distribution System seeking financial assistance for this work through a low-interest rate loan offered by EGLE. This Project Plan identifies projects that will include improvements to both the water treatment plant and the distribution system on a fiscal year basis.

2.2 Study Area Description

2.2.1 Delineation of Study Area

The City of Traverse City is located in Grand Traverse County in the northwest Lower Peninsula. The City is situated on the southern shores of Grand Traverse Bay. The City maintains great pride in ensuring high-quality drinking water and reliability to its residents as well as protecting the clean waters of Grand Traverse Bay.

The City supplies potable drinking water to the City and three surrounding townships through bulk water agreements with Garfield Township (5 mgd maximum), Elmwood Township (0.75 mgd maximum), and Peninsula Township (1 mgd maximum). An emergency connection is also provided with the East Bay Township water distribution system which operates at a higher system pressure and a dissimilar water quality (groundwater source).

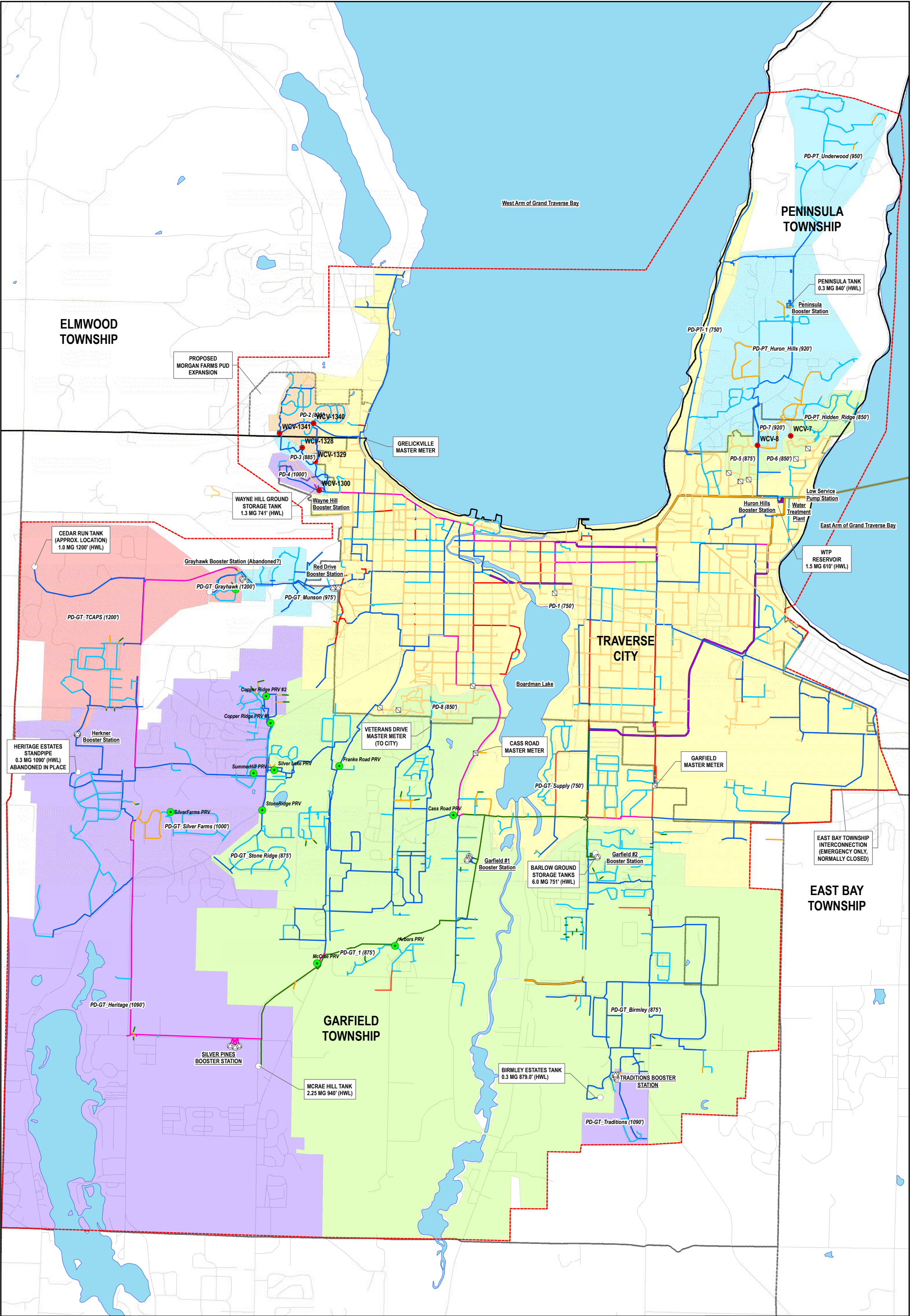
Figure 2-1 depicts the water system service area and Figure 2-2 depicts the City's water distribution system

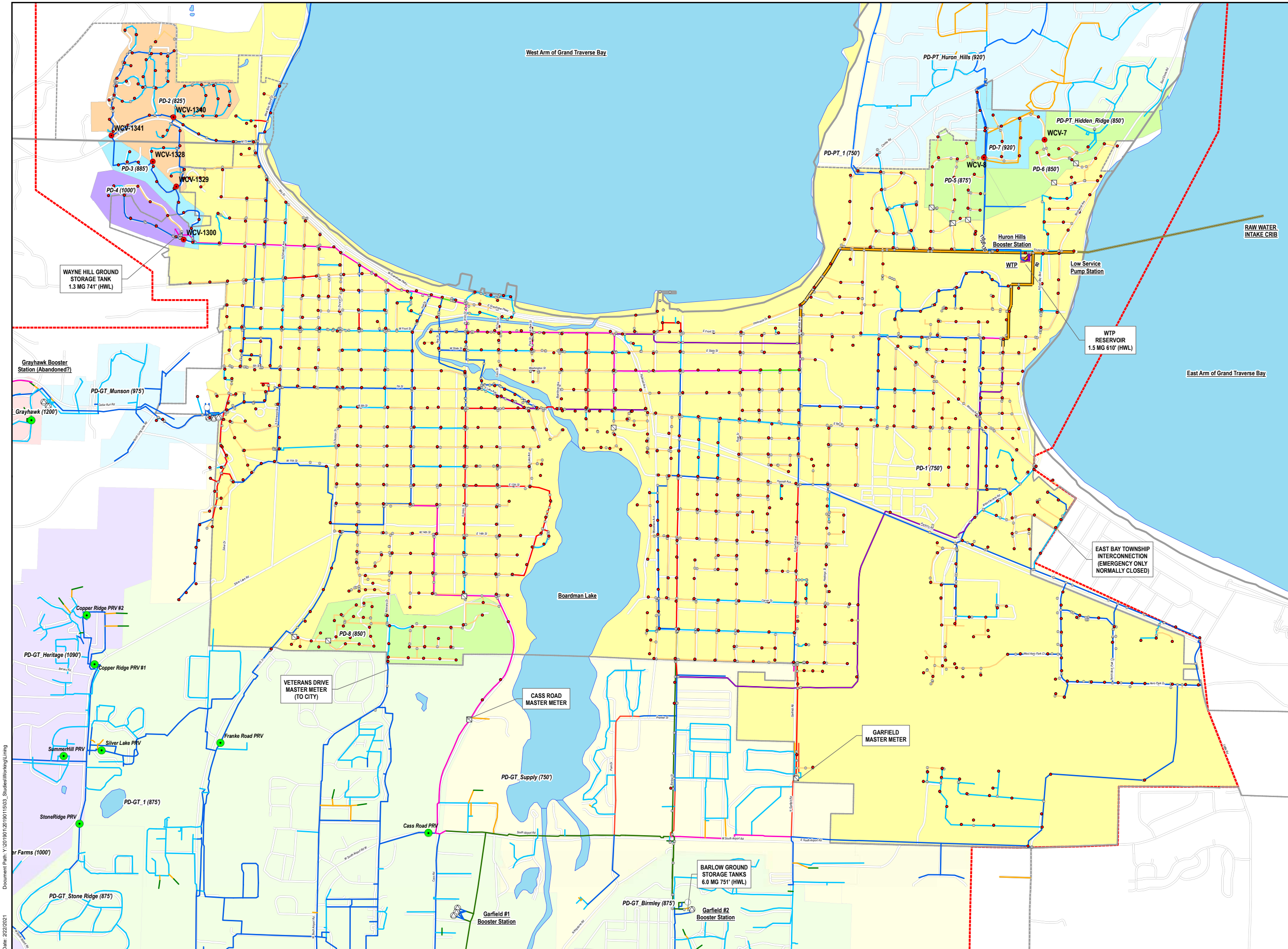
The City's raw water supply is from an intake structure from the east arm of Grand Traverse Bay (East Bay). The City's original water supply was located near the City in West Bay in the 1890s and was relocated to East Bay, which is more protected from runoff and potential contamination sources, in 1965. Treatment is provided by a 20 million gallon per day (mgd) Water Treatment Plant (WTP) located in the City near the intake in East Bay. The WTP was converted to direct filtration in 1993 and is equipped with four low service pumps (raw water), two flocculators, five rapid sand filters, two clear wells, finished water storage, and five high service pumps (finished water).

The City's water distribution system provides water service for water use and fire flows throughout the City's service area. The City's system comprises 660,340 feet (125 miles) of water main and two booster pumping stations. Approximately two-thirds of the piping is cast iron and the majority of the water mains were constructed in the 1960s and prior. New ductile iron mains have been installed since the 1980s.

2.2.2 Land Use

The largest land use types within the City of Traverse City (excluding open spaces and utilities) are residential and commercial. A map with the current zoning districts within the City of Traverse City can be seen in the attached Figure 2-3. In addition, a map of the future land use within the City of Traverse City can be seen in the attached Figure 2-4. Future land use for the City was obtained from the City of Traverse City Master Plan.





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LEGEND

- Check Valve
- PRV
- Hydrant
- System Valve
- City/Township
- Water System Service Area
- County

Water Main

- 6"
- 8"
- 10"
- 12"
- 16"
- 18"
- 20"
- 24"
- 30"
- 36"

Pressure District HGL

- 750
- 751 - 825
- 826 - 884
- 885 - 999
- 1000 - 1090
- 1091 - 1200

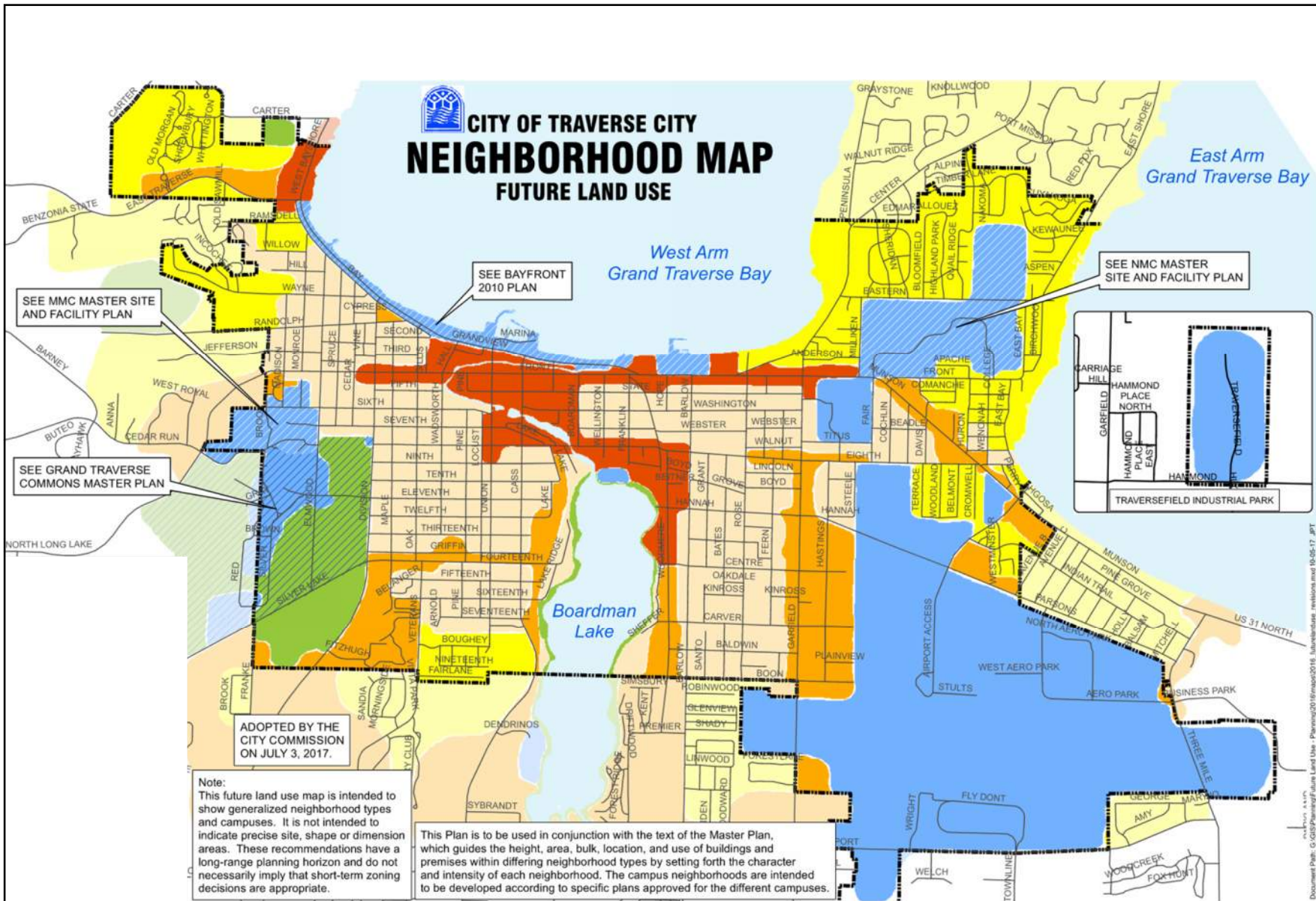
FIGURE A-2

TRAVERSE CITY

WATER DISTRIBUTION SYSTEM

2020 WATER SYSTEM
RELIABILITY STUDY UPDATE

NOVEMBER 2020 HRC #: 20200232



CITY OF TRAVERSE CITY MICHIGAN

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Legend

- City Limits
- Neighborhood Types**
 - TC-1 Conservation
 - TC-2 Conventional
 - TC-3 Traditional
 - TC-4 Corridor
 - TC-5 Downtown
 - TC-C Campus Plan

City of Traverse City Asset Management/GIS

NOT TO SCALE

COURTESY OF CITY OF TRAVERSE CITY

FIGURE 2.4
 CITY OF TRAVERSE CITY
 FUTURE LAND USE MAP

2021 DWSRF
 PROJECT PLAN

MAY 2021 HRC#: 20210137

2.2.3 Water Demands

The water consumption data was provided by the City and is provided in Table 2-1 provides a summary of the water use records in the City and each customer community.

Table 2-1. Water System Demands

Fiscal Year	Total Supplied (mgd)	Traverse City (mgd)	Garfield Township (mgd)	Peninsula Township (mgd)	Elmwood Township (mgd)	Total Billed (mgd)	Unaccounted Water (mgd)	Loss (as % of Supplied)
2010	4.81	2.17	1.58	0.13	0.019	3.90	0.91	18.9%
2011	5.38	2.15	1.64	0.13	0.017	3.93	1.45	27.0%
2012	5.89	2.30	1.71	0.16	0.020	4.19	1.70	28.9%
2013	6.00	2.33	1.55	0.16	0.031	4.08	1.92	32.0%
2014	5.69	2.49	1.35	0.15	0.032	4.03	1.67	29.3%
2015	5.71	2.17	1.41	0.16	0.041	3.74	1.93	33.8%
2016	5.83	2.32	1.63	0.19	0.031	4.18	1.66	28.4%
2017	5.34	2.39	1.68	0.17	0.031	4.26	1.08	20.2%
2018	5.19	2.06	1.80	0.18	0.032	4.07	1.12	21.6%
2019	5.41	2.47	1.69	0.17	0.028	4.35	1.06	19.6%
2020	4.85	1.94	1.79	0.20	0.039	3.97	0.88	18.1%

Notes:

1. From City's Water Output and Financial History Report
2. Community demands from Township meter records

Unaccounted for water or water loss in the system from unmetered losses were determined by tabulating the water pumped and comparing the billed amount for the City and each Township. Water loss estimates before 2017 are less accurate as the new high service pump station flow meters were installed in November 2015. Since 2017, the unaccounted water comprises approximately 19.9% of the total water supplied. The typical goal of unaccounted water in municipal water systems is 10%. The estimated losses are not adjusted for seasonal flushing and fire flows which can comprise up to 2% of the water loss.

2.3 Population Data

Population numbers and projections for Grand Traverse County and the City of Traverse City came from the United States Census Bureau database. The U.S. 2010 Census Bureau data estimated the average household size in the City at 2.18 people per household. The population projections for the City of Traverse City and Grand Traverse County are shown below in Table 2-2.

Table 2-2. Population Projections

Year	Grand Traverse County	City of Traverse City		Garfield Township		Elmwood Township		Peninsula Township		Total
	Total	Total	Service	Total	Service	Total	Service	Total	Service	Service
1990	64,273	15,115	15,115	10,516	NA	3,427	NA	4,340	NA	NA
2000	77,654	14,532	14,532	13,840	9,985	4,264	321	5,265	1,570	26,408
2010	86,986	14,674	14,674	16,526	11,923	4,503	339	5,433	1,620	28,556
2015	91,541	15,323	15,323	16,953	12,231	4,500	339	5,696	1,699	29,591
2020	98,023	14,818	14,674	20,028	14,450	4,762	358	5,609	1,673	31,155
2025	104,056	14,891	14,674	22,049	15,907	4,897	369	5,699	1,700	32,649
2030	110,461	14,963	14,674	24,273	17,512	5,036	379	5,790	1,727	34,292
2040	124,477	15,110	14,674	29,417	21,223	5,325	401	5,978	1,783	38,081
Growth Rate	1.20%	0.10%		1.94%		0.56%		0.32%		0.81%

Notes:

1. Population data from the US Census Bureau, Networks Northwest, and City of Traverse City
2. 5-year planning period will be 2025 and the 20-year planning period will be 2040
3. Correspondence with City

2.4 Economic Characteristics

The major industries in the City of Traverse City are Health Care & Social Assistance (1,396 people), Retail Trade (1,008 people), and Accommodation & Food Services (844 people). The median household income for the City of Traverse City was \$57,076 in 2019. The median household income is approximately 0.11% lower than the median Michigan household income and 9.18% less than the U.S. median household income. Table 2-3 shows the City of Traverse City, Grand Traverse County, and Leelanau County median household income comparison below.

Table 2-3. Study Area Household Income

Municipality	Median Annual Household Income
City of Traverse City	\$57,076
Grand Traverse County	\$61,485
Leelanau County	\$63,575

*Source: <https://www.census.gov/quickfacts/fact/table/MI,traversecitycitymichigan,grandtraversecountymichigan/PST045219>

2.5 Cultural and Environmental Settings

2.5.1 Cultural Setting

The City of Traverse City has 4 historical districts and 5 historical properties listed under the National Register of Historic Places. The State Historic Preservation Office (SHPO) is to be contacted for proposed work within the affected Historic Districts. Correspondence with the SHPO can be noted in Appendix A. The relatively shallow excavations needed to complete the proposed work will be contained within public right-of-way and on private properties. All the proposed work will occur at the same location as existing facilities and lines. Restoration of surface features disturbed by this construction will match existing conditions as much as practicable. Therefore, there is no anticipated permanent impacts on any historical, archeological, geological, cultural, or recreational areas due to this construction. EGLE will be coordinating with the SHPO for final determination of historic properties impacted.

2.5.2 The Natural Environment

Climate

The project area's climate is controlled by its location with respect to major storm tracks that pass through the Midwest and by the influence of Lake Michigan and the Grand Traverse Bay. Lake Michigan tends to moderate and smooth out most climate extremes. Consequently, the City generally experiences warm, mild summers and severe winters. The summer high is around 80 degrees Fahrenheit, and the winter low is around 16 degrees Fahrenheit. Precipitation is distributed through all months of the year. Lake-effect snowfall constitutes a large percentage of the total annual snow accumulation, which averages around 118 inches. Periods of snowfall typically last from November to April, although light snow as late as May or as early as late September sometimes occur. Rain averages around 33 inches annually.

The growing season averages 152 days in length. Average date of the last freezing is May 27; average date of the first freezing temperature is October 1.

Climatological data is collected by the National Oceanic and Atmospheric Administration (NOAA). This project, and the alternatives discussed, will have no impact on the climate of the project.

Air Quality:

Mobile source emissions, mainly from automobiles, are the primary source of outdoor air pollution in this area. The area has the noise pollution characteristics of a typical, tourist-driven community. No noise pollution problems exist in residential areas, other than from traffic noise from adjacent major roadways. Commercial and business areas experience only normal traffic noise.

Air quality is not anticipated to be an issue for this project, apart from temporary dust and debris from construction. All necessary notifications will be distributed to the public when this occurs and all regulations for this odor will be followed.

Wetlands:

There are no localized wetlands associated within the existing project footprint where the work is anticipated. For final design, any wetlands that may be impacted would be flagged and the appropriate EGLE and USACE permits will be applied for. However, it is not anticipated to be an issue for this project. Wetland maps are shown in Figure 2-5.

Great Lake Coastal Zones:

The major body of water north of the City of Traverse City is Grand Traverse Bay, which is approximately 0.25 miles from the WTP. The WTP is located on southeast sector of the peninsula jutting out into the Bay. For this project plan, no impacts will be made to the Bay or tributary areas.

Floodplains & Surface Waters:

The study area is located entirely in the Grand Traverse Bay Watershed. The watershed encompasses 976 square miles with nine sub watersheds that drain directly into the Grand Traverse Bay.

The City of Traverse City is located along the Grand Traverse Bay. Area groundwater is not used as a source of drinking water within the City. Water supply for the City is obtained via the City of Traverse City Water Treatment Plant from Lake Michigan. There will be no major impacts to the great lake coastal zones, floodplains, and surface waters, however, proper permits will be acquired, and steps will be taken to avoid any damage or permanent disruption which could affect the nearby floodplain. Any work which impacts the floodplain will only be undertaken after first contacting EGLE and obtaining the appropriate permits.

FEMA floodplain maps are shown in Figure 2-6.

Natural or Wild and Scenic Rivers:

The scope of this project is throughout the City of Traverse City and associated townships. Kids Creek and the Boardman River are located within the City. The location of these improvements and construction will be planned to not occur or impact the nearby rivers. See Appendix B for the attached documentation of the Nationwide Rivers Inventory correspondence.

Recreation Facilities:

The City of Traverse City owns 34 parks and recreational properties, ranging from a small downtown parcel to the larger Hickory Hills Ski Area, Grand Traverse Commons and Brown Bridge Quite Area. Much of the park land is heavily concentrated along the Boardman River and along the shoreline of the West Grand Traverse Bay. In total, over 1,600 City-owned acres are currently dedicated to the recreational pursuits including Hickory Hills Ski Area and Grand Traverse Commons that are each approximately 125 acres and Brown Bridge Quite Area, located 10 miles southeast of the City, has nearly two square miles (1,310 acres) of natural area along the Boardman River. No parks or other publicly owned facilities will be impacted by the proposed work.

National Natural Landmarks:

There are no registered natural landmarks in Grand Traverse county, therefore no National Natural Landmarks will be affected.

Topography:

The terrain within the City of Traverse City is characterized as relatively flat but has relative low spots near the Grand Traverse Bay. The lowest point at about 600 feet above sea level is in the north region of the City on the bay along the shoreline. The highest point is about 800 feet above sea level on the outskirts of the City heading out toward the hillier project associated townships.

A set of United States Geological Survey (USGS) topography maps of the city and surrounding townships are shown in Figure 2-7 through Figure 2-11.

Geology:

The City of Traverse City is typified by eolian, lake, and glacial deposits. The lake sand deposits make up the larger portion of the City of Traverse City. Two types of bedrock make up the bedrock surface in the City of Traverse City, Ellsworth Shale and Coldwater Shale.

Soils:

According to the USDA Natural Resources Conservation Service Web Soil Survey, the City of Traverse City the 3 main soils located within the City are Loamy Sand (27.53%), Sandy Loam (14.78%), and Sand (39.73%). See Appendix C for documentation of the Web Soil Survey results.

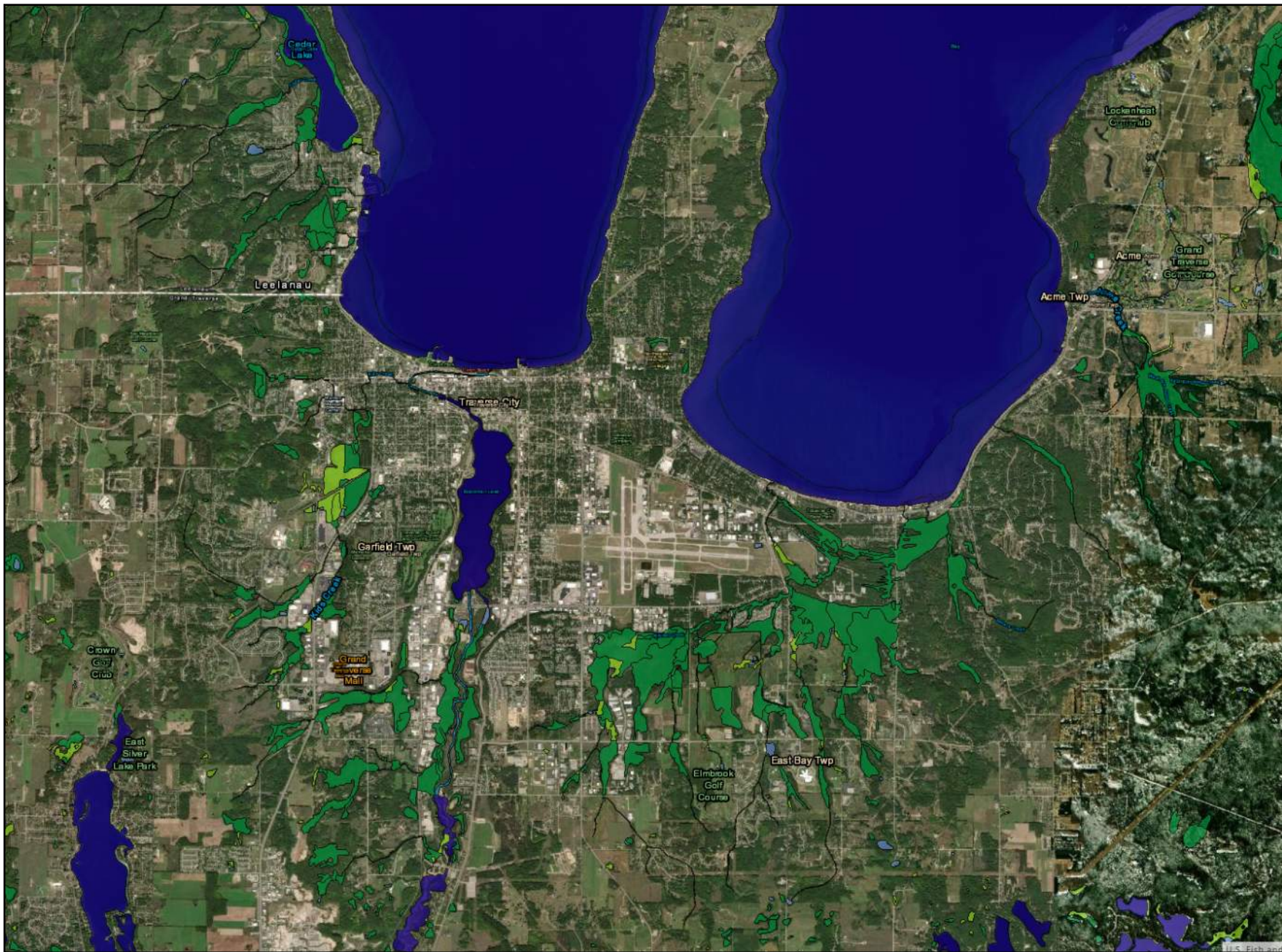
As part of the final design process, soil borings will be taken near the proposed work areas to determine if any special construction methods will be needed.

Agricultural Resources:

There is no agricultural land located within the project limits. The project area is within developed and human use land cover; therefore, no agricultural resources will be impacted by the proposed work.

Existing Plant and Animal Communities:

Wildlife within the study area includes animals and birds normally associated with urban or agricultural environments. Because this project will be contained in an urban area where no suitable wildlife habitat is present as well as limited to existing structures, it is not necessary to contact U.S. Fish and Wildlife (USFW) to confirm that there will be no effect to endangered or threatened species. A list of all endangered and threatened species generated by the Michigan Natural Features Inventory can be seen in Appendix D.





LEGEND

WETLANDS

-  Estuarine and Marine
-  Deepwater
-  Estuarine and Marine Wetland
-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Other
-  Riverine

RIPARIAN

-  Forested/Shrub
-  Herbaceous

COURTESY OF U.S. FISH &
WILDLIFE SERVICE

FIGURE 2.5
CITY OF TRAVERSE CITY
WETLANDS MAP

2021 DWSRF
PROJECT PLAN

MAY 2021

HRC#: 20210137

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was provided in digital format by the National Aerial Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2007 or later.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/mfp>.

FIRM
FLOOD INSURANCE RATE MAP
GRAND TRAVERSE COUNTY, MICHIGAN
(ALL JURISDICTIONS)

PANEL 0113C
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	DATE	STATUS
Grand Traverse	00001	10/12	C
Grand Traverse	00002	07/11	C

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
2605SC0113C
EFFECTIVE DATE
AUGUST 28, 2015

Federal Emergency Management Agency



HRC
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LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO FLOODING BY THE 1% ANNUAL CHANCE FLOOD**
The 1% annual chance flood (100-year flood) also known as the 100-year flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, and V. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
ZONE AE Base Flood Elevation determined.
ZONE AH Flood depths of 1 to 3 feet (locally where flow on existing levees); average depths determined. For areas of unusual flow flooding, elevation also determined.
ZONE AO Flood depths of 3 to 5 feet (locally where flow on existing levees); average depths determined. For areas of unusual flow flooding, elevation also determined.
ZONE AR Special Flood Hazard Areas (SFHA) protected from the 1% annual chance flood by a flood control system that also incorporates floodway protection. Zone A protection from the 1% annual chance or greater flood. Areas in the protection from the 1% annual chance flood by a flood control system under construction, to Base Flood Elevation determined.
ZONE V Coastal flood zone with velocity based (wave action); no Base Flood Elevation determined.
ZONE VE Coastal flood zone with velocity based (wave action); no Base Flood Elevation determined.
- FLOODWAY AREAS IN ZONE AE**
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of obstructions so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS**
ZONE A Areas of 1 to 2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot, or with changing areas less than 1 square mile, and areas protected by levees from 1% annual chance flood.
ZONE B Areas determined to be subject to the 1% annual chance floodplain. Areas in which flood heights are undetermined, but possible.
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPA)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
1% Annual Chance Floodplain Boundary
10% Annual Chance Floodplain Boundary
Floodway Boundary
Zone A Boundary
Zone V Boundary
CBRS and OPA Boundary
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. Special Flood Hazard Areas of different Base Flood Elevation, and flood depths, are shown. Base Flood Elevation line and value, elevation in feet.
Base Flood Elevation value where uniform within area, elevation in feet.
Referenced to the North American Vertical Datum of 1988.
- Map Symbols**
Cross section line
Flooded area
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) (decimal form)
100-year coastal Transverse Mercator grid values, zone 16
Bench mark (see appearance in Notes to Users section of the FIS report)
Area HRA
Map repository
Refer to the Flood Insurance Study report for this jurisdiction.
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2015
EFFECTIVE DATE OF REVISIONS TO THIS PANEL

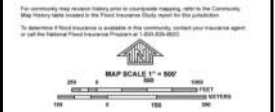
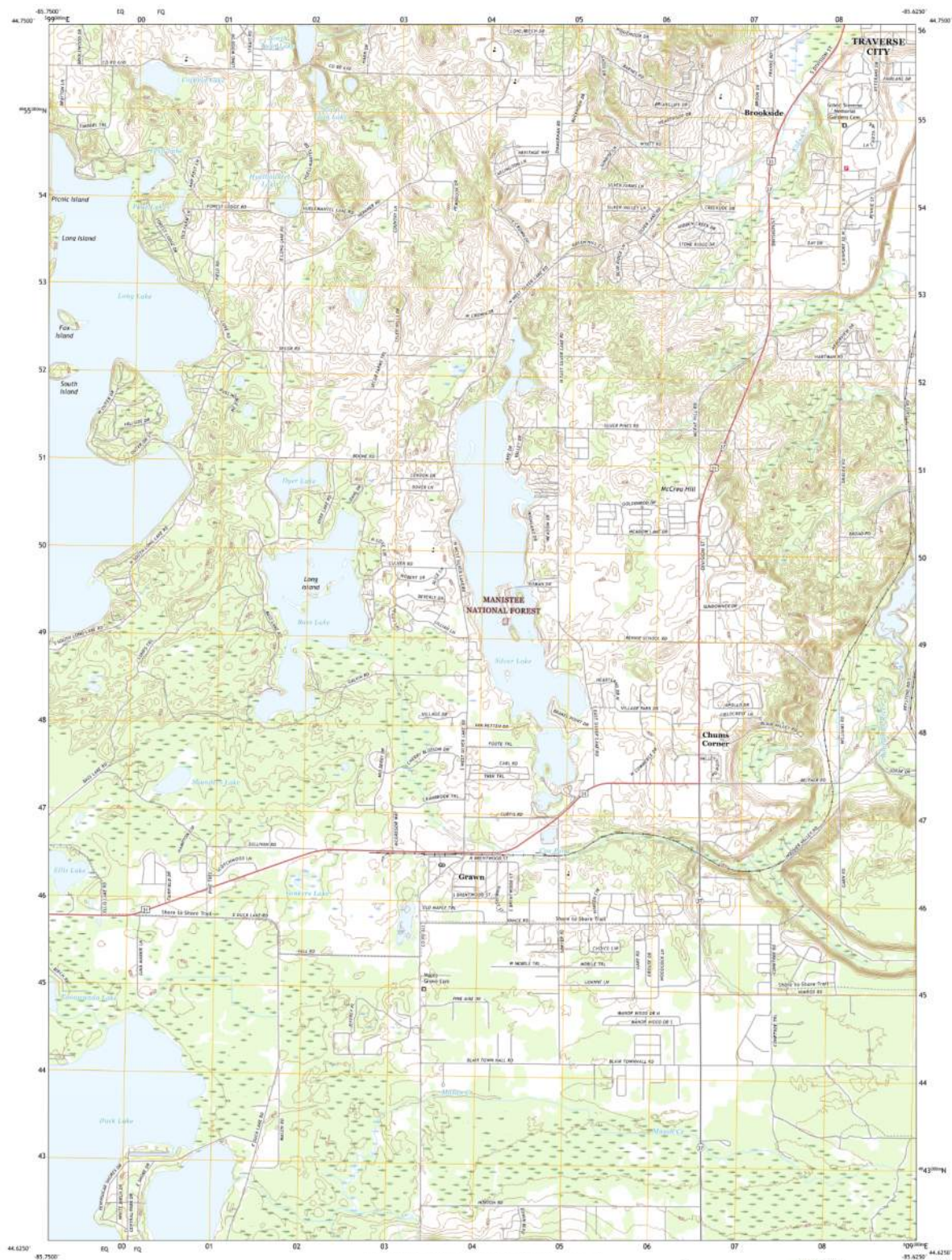


FIGURE 2.6
CITY OF TRAVERSE CITY
FLOODPLAIN MAP

2021 DWSRF
PROJECT PLAN

MAY 2021 HRC#: 20210137



ROAD CLASSIFICATION

Expressway	—————	Local Connector	—————
Arterial Freeway	—————	Local Road	—————
State	—————	SRD	—————

 Interstate Route  US Route  State Route

 US Highway Route  R-1 Recreational Route  R-2 High Connector Route

Check SRD local Parking Service web

GRAWN, M.
2019

UTM GRID AND DTM MAGNETIC NOW
EXPLANATION AT BOTTOM OF PAGE

FIGURE 2.7
CITY OF TRAVERSE CITY
USGS TOPO MAP A

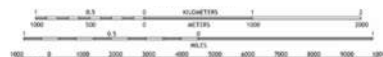
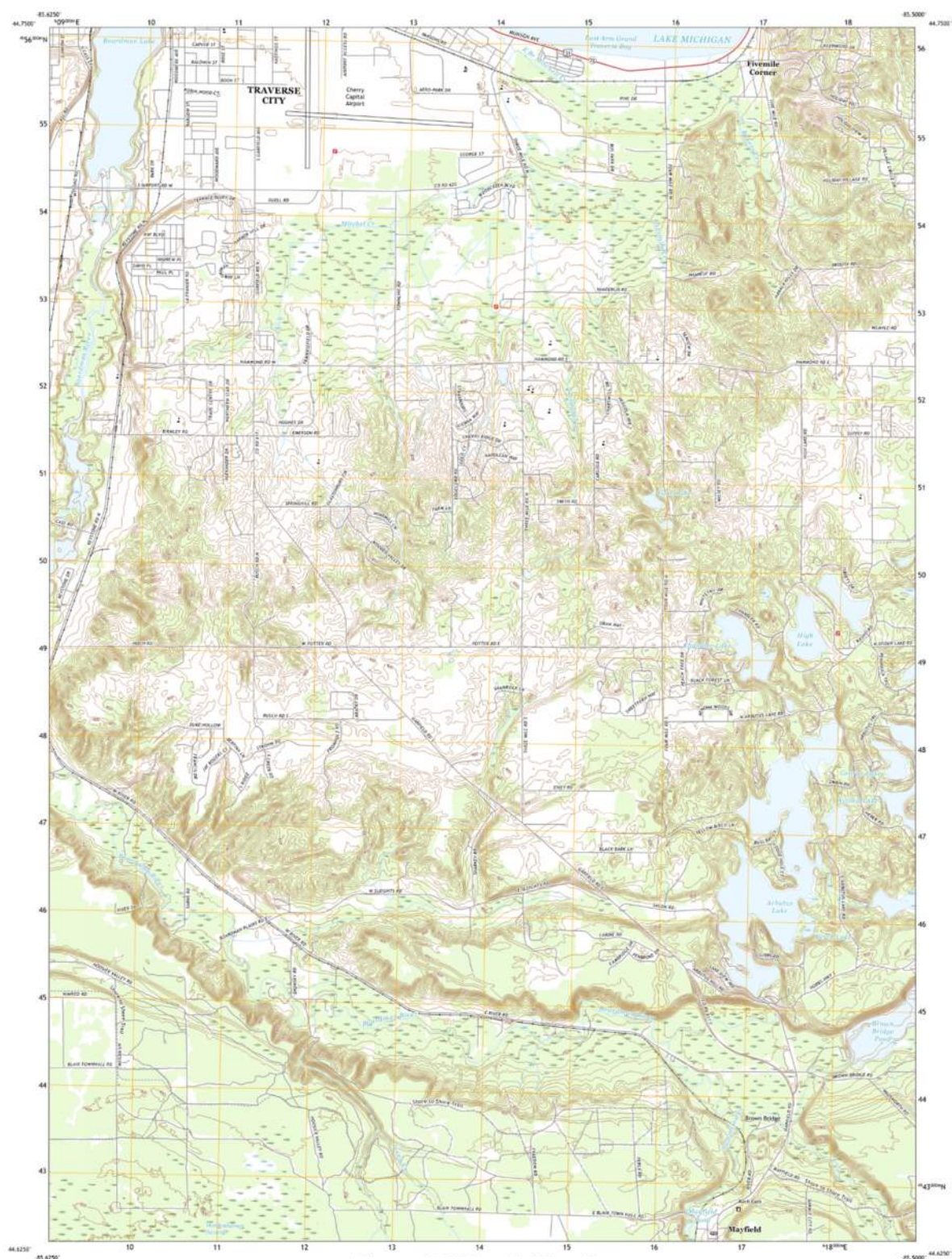
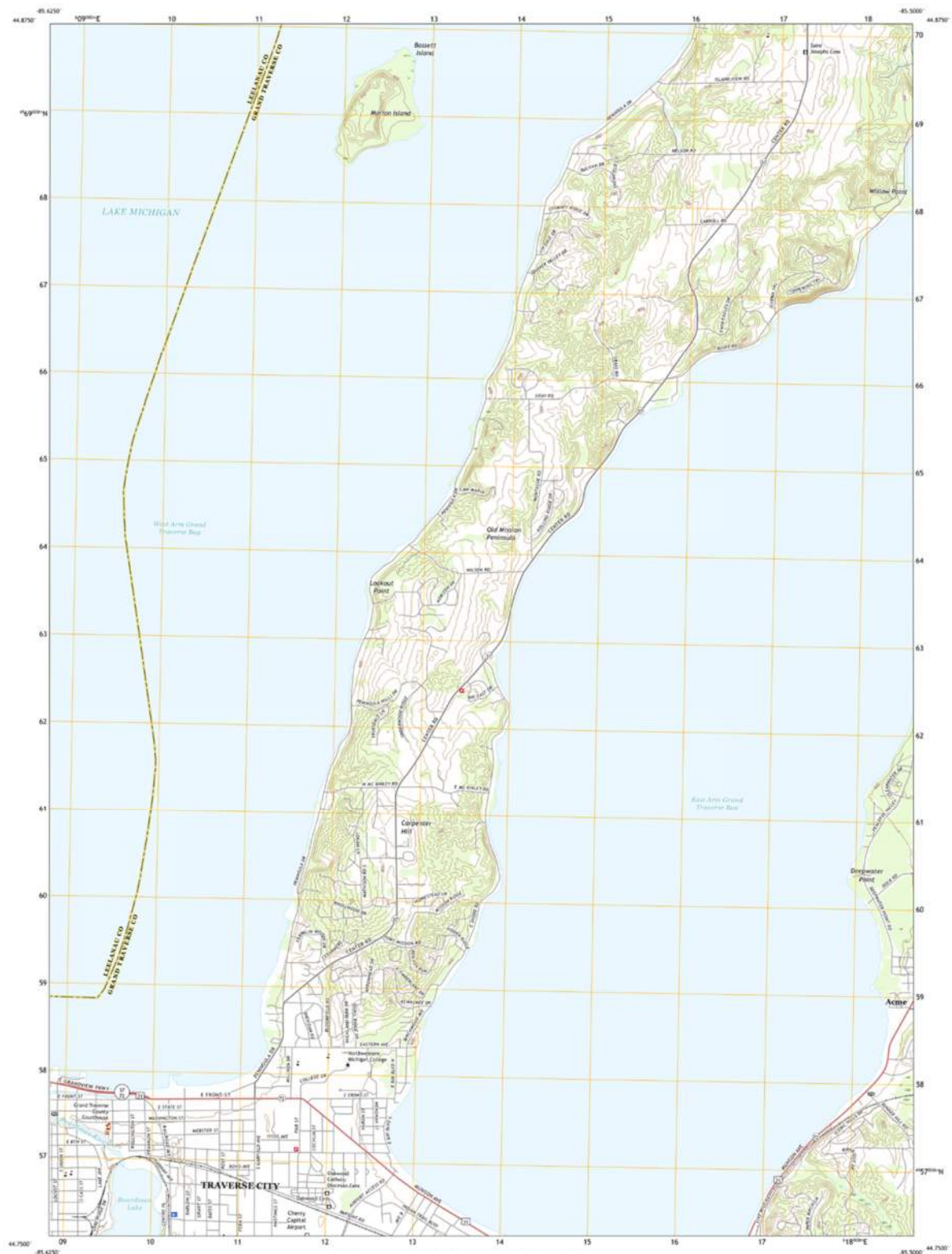
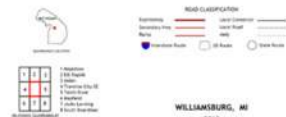
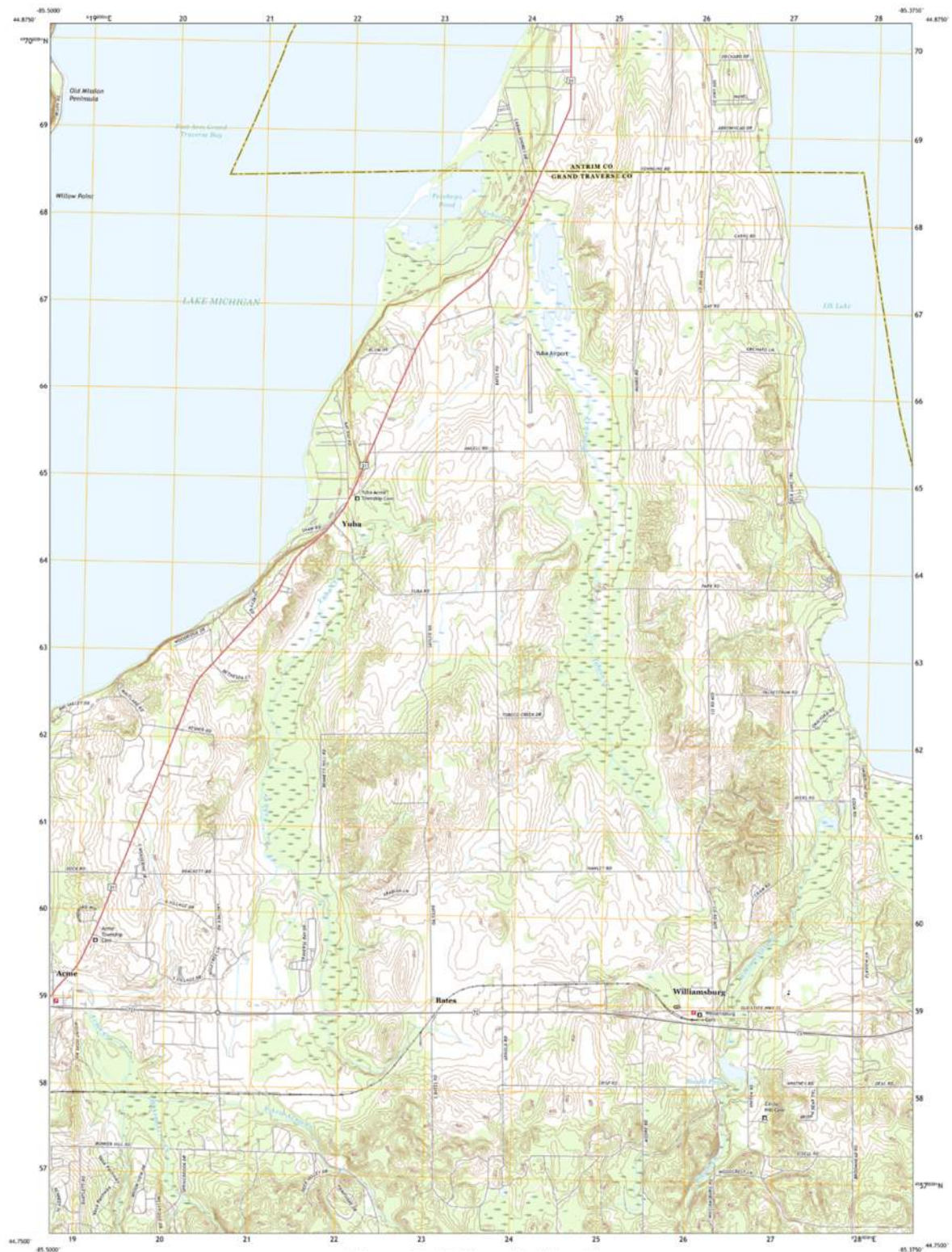


FIGURE 2.8
CITY OF TRAVERSE CITY
USGS TOPO MAP B







2.6 Existing Water Supply System

2.6.1 Water Supply and Treatment

2.6.1.1 Raw Water Pumping and Intake

The City treats water from the east arm of Grand Traverse Bay in Lake Michigan. The Low Service Pump Station (LSPS) is located on Eastern Avenue pumps water from a 36-inch diameter raw water intake pipe and crib structure (located 4,000 feet offshore) to the Water Treatment Plant. The station is a 38-ft diameter circular caisson with a split wet well and a total of four vertical turbine pumps. Low Service Pumps No. 1, 2, and 4 are constant speed pumps, and pump No. 3 motor was replaced in 2019 and operates on a VFD and the speed is controlled to vary the raw water flow rate to the WTP. The pumps discharge to a single 30-inch cast-iron raw water main along Eastern Avenue.

2.6.1.2 Rapid Mix and Flocculation

Raw water entering the treatment plant flows through the 30-inch pipe in the lower level. Raw water is measured by a single 30-inch magnetic flow meter installed in 2015. The single 30-inch line splits into two 24-inch pipes that are installed in parallel, each equipped with inline mixers. Ferric sulfate is applied before each of the mixers. The water then flows to two flocculation basins each having a center draft tube and variable speed flocculator (mixer). The flocculation tanks provide 27 minutes of detention time at their rated capacity of 10 mgd each (20 mgd total). A circular weir launder controls the water surface within the tanks and discharges the flow to a 36-inch pipe before it is applied to the filters.

2.6.1.3 Filtration

Filtration is provided by five filters and each is rated for 4 mgd at a filtration rate of 4 gallons per minute (gpm) per square foot (sf). Each filter is comprised of two 14-ft by 25-ft cells configured for simultaneous normal operation and individual surface wash and backwash. Filters 4 and 5 were rehabilitated in 2014 and equipped with HDPE underdrains with four layers of gravel for an overall depth of 9-inches for media support. 30 inches of dual media is comprised of 18-inches of sand and 12-inches of anthracite. Each cell contains two rotating surface wash assemblies. Filters 1, 2, and 3 currently have clay block and gravel for media support, and the underdrains are scheduled to be inspected and rehabilitated in 2021-2022. The gravel and sand media and the influent, surface wash, backwash drain, filter effluent, and backwash supply valves for Filters 1, 2, and 3 will also be replaced in 2021-2022.

The filtered water production is monitored and controlled by a dedicated rate of flow controller connected to SCADA. Individual filter effluent turbidity is monitored, and each filter console provides monitoring and control for washing of its associated filter(s). Three filter consoles are located on the filter operating level. The original consoles were constructed in 1964 for Filters 1 and 2. Filter 3 console was installed in 1973 and Filter 4 and 5 consoles were constructed in 1993.

A surface wash pump provides suitable supply and pressure to rotate the pair of surface washers in each bay. The surface wash pump is rated at 225 gpm at 176 feet TDH. There is no redundant supply.

The filters are backwashed by closing the filter effluent valve and opening the wash water supply and backwash drain valves for each cell. The backwash water is supplied by the filter backwash pump, which is rated at 8,000

gpm at 40-ft TDH. Backwash water can also be supplied by a 14-inch line from the high service pump station efflux using the filter backwash control valve located in the basement level. The filters are backwashed when the filter head loss is at 8.5 to 10 feet. Filters are typically washed for 10 to 15 minutes at 3,000 to 4,000 gpm. The average run time between backwashes is 80 to 100 hours in the winter and 40-60 hours in the summer. Typically, up to 75,000 gallons are used per filter backwash. The monthly average backwash volume ranges from 90,000 gal during low demand periods up to 150,000 gal during higher demand summer months.

Filter piping is in the filter gallery on the lower level of the WTP. Each filter is served by a total of nine (9) valves; one modulating valve for filter rate control and eight that are in either the open or closed position. Pneumatic valve actuators serve Filters 1, 2, and 3 and electric valve actuators serve Filters 4 and 5. Filters are flow-paced based on magnetic flow meter information. Filter-to-waste capability is provided for Filters 4 and 5. There is no filter-to-waste currently available on Filters 1, 2, and 3.

2.6.1.4 Clear Wells and Treated Water Reservoir

Filtered water flows to two clear wells located beneath Filters 1, 2, and 3. One clear well is below Filters 1 and 2 and the other clear well is below Filter 3. Filters 4 and 5 and can be piped to either of the clear wells. From the clear wells, the water passes through piping where fluoride is applied before entering the 1.5-million-gallon rectangular storage reservoir which is partially below grade and located south of the WTP building. Chlorine can also be applied near the fluoride application point. The reservoir is baffled to provide suitable contact time to achieve satisfactory disinfection contact time. Water exiting the treated water storage reservoir flows through a 36-inch finished water main to the high service pump suction well. A separate 12-inch finished water main feeds the Huron Hills Pump Station suction well.

2.6.1.5 Chemical Feed

Coagulant

The WTP uses ferric sulfate as its primary coagulant which replaced the original equipment which fed aluminum sulfate (alum). This system, which was installed in 2017, is equipped with three 1000-gallon double-walled fiberglass storage tanks, three metering pumps, and a 100-gallon day tank and scale. The ferric bulk storage provides sufficient storage for a minimum of 30 days at maximum daily demand. The storage tank valves are manually opened to fill the 100-gallon day tank. Coagulant aids such as polymers are not used.

Fluoride

The WTP feeds hydrofluosilicic acid using a feed system that consists of two 1000-gallon double-walled fiberglass storage tanks, one transfer pump, one 100-gallon day tank, and a metering pump. The storage tank and day tank have sufficient storage for maximum daily demands.

Disinfection

The WTP feeds sodium hypochlorite using a feed system including two 8,200-gallon bulk storage tanks, two transfer pumps, a 450-gallon day tank with scale, and three metering pumps. Chlorine is fed to several locations in the WTP including the raw water intake for zebra mussel control.

Antiscalant

The WTP adds sodium hexametaphosphate to prevent calcification within the disinfection feed piping. The sodium hexametaphosphate feed system is comprised of a batch tank and chemical pump located in the chlorine room.

2.6.1.6 Wash Water and Sludge Lagoons

Two lagoons are used for wash water and sludge waste from the filter backwash and flocculation tank drain water. The two lagoons are approximately 61,000 cubic feet and 66,000 cubic feet respectively. The water is decanted and the decant drains by gravity through an 8-inch drain to a 5-ft diameter sump in the WTP basement. There are two sump pumps which return discharge to the storm sewer on Eastern Avenue with an NPDES permitted outfall to East Bay. These sump pumps were replaced in 2015 and 2017 and are each rated for 500 gpm. Sodium thiosulfate is added to dechlorinate the discharge per the NPDES permit.

2.6.1.7 High Service Pumping

The High Service Pump Station (HSPS) pumps treated water from the WTP to the distribution system from two wet wells which are connected to the Finished Water Storage Reservoir. The HSPS has five vertical turbine pumps which discharge to two 24-inch water mains that connect to the 30-inch water main on Eastern Avenue. A surge relief valve is provided on the discharge main for surge protection. The flows in each water main are measured using 24-inch magnetic flow meters which were installed in November 2015.

2.6.1.8 Plant Capacities and Redundancy

A summary of the current unit processes is provided in Table 2-4.

Table 2-4. Unit Process Capacities

Unit Process	Total Capacity (mgd)	Firm Capacity (mgd)	Basis of Capacity
Intake	24.0	24.0	Max head loss
Low Service Pump Station	27.6	19.7	Pump test (2020)
Flocculation Tanks	20.0	20.0	30 min residence time
Filters	20.2	20.2	Filter rate 4 gpm/sf
Clearwell/Reservoir	38.2	38.2	Capacity to maintain C*T = 61
High Service Pump Station	27.4	19.9	Pump test (2015)
Lagoons	32.0	32.0	3% of Design Flow (0.95 mgd)

2.6.2 Storage Facilities

The City's water system includes four ground level finished water storage tanks. These include the one water storage tank at the WTP having a total of 1.5 million gallons (mgal) of storage, two water storage tanks located on LaFranier Road south of South Airport Road with a total of 6.0 mgal of storage, and Wayne Hill tank with 1.3 mgal of storage. Due to hydraulic limitations with the booster pump suction piping that draws from the Wayne Hill tank, the available volume in the Wayne Hill tank is 0.67 mgal. The Barlow and Wayne Hill tanks are located at higher elevations within the City and essentially function as elevated tanks, providing the required pressure of the Central PD-1 distribution system. Several other tanks provide storage for separate pressure districts in the City, Garfield Township, and Peninsula Township. The total available storage in the City is 6.74 mgal.

2.6.3 Water Distribution Piping

The City's water distribution system provides water service for potable use and fire flow throughout the City's service area. The system comprises 660,340 feet (125 miles) of water main and approximately two-thirds of the system is cast iron and the majority of the water mains were constructed in the 1960s and prior. New ductile iron mains have been installed since the 1980s.

2.6.4 Pressure Districts and PRVs

The City's water system operates in eight pressure districts with several incorporated into the surrounding Township's pressure districts. The pressure districts are controlled by the ground storage tanks, booster pump stations, and various pressure reducing valves (PRVs). These districts are summarized in Table 2-5.

Table 2-5. City Pressure Districts

District ID	District Name	HGL (ft)	Controlled by:
PD-1	Central	750	Barlow and Wayne Hill Tanks
PD-2	Morgan Farms/Incochee	825	Control Valves WCV-1341, WCV-1328, WCV-1329
PD-3	Incochee Upper	875	PRV at Wayne Hill Booster Station, WCV-1300
PD-4	Wayne Hills Upper	1000	Wayne Hill Booster Pumps
PD-5	Huron Hills Lower	850	Huron Hills PRV WCV-7
PD-6	Timber Lane	875	Timber Lane PRV WCV-8
PD-7	Huron Hills Upper	920	Huron Hills Booster Station
PD-8	Veterans Drive (from Garfield)	875	McRae Hill PRV (Garfield Township)

Pressure District PD-1 is the main pressure district in the City and encompasses most of the service area within the City limits as well as lower elevations of Elmwood, Garfield, and Peninsula Townships. This district's pressure is maintained by the Barlow and Wayne Hill ground storage facilities and has an operating hydraulic grade line (HGL) of 750 feet. Three other pressure districts are maintained by the Wayne Hill Booster Station (described below). PD-4 is maintained at an HGL of 1000 feet to service customers on Wayne Hill. Pressure District 3 (PD-3) is currently maintained at an HGL of 885 feet using a pressure sustaining valve (PSV) that down-feeds from PD-4 located at the Wayne Hill Booster Station (WCV-1300). The lower pressure district, PD-2, is maintained at an HGL of 825 feet using PSVs: WCV-1328, WCV-1329, and WCV 1341 that are down-fed from PD-3 through.

A Pressure Regulating Valve (PRV) located at M-72 (WCV 1340) is also used to supplement fire flows to the City's main pressure district PD-1 for the far northwest portion of this district.

Three higher pressure districts in the City limits are controlled by the Huron Hill Booster Station system. This station feeds the intermediate pressure district in the southern portion of Peninsula Township (HGL = 920 feet) as well as higher elevations in the City adjacent to the Township including Pressure District PD-7 (HGL = 920 feet), PD-6 (HGL=875 feet), and PD-5 (HGL=850 feet). Two City PRVs downfeed from PD-7 to maintain pressures in districts PD-5 and PD-6. Pressure District PD-6 is maintained by WCV-7 (HGL = 875 feet) and Pressure district PD-5 is controlled by WCV-8 (HGL = 850 feet). Check valves in the lower elevations of these districts are installed at the boundaries of district PD-1 to maintain minimum system pressures in these districts during extreme conditions or during interruptions of supply in the higher elevation districts.

One pressure district (PD-8) is back-fed from Garfield Township (Veteran's Drive Pressure District) to the City, east and west of Veterans Dr. south of Boughey Drive and operates at an HGL of 875 feet. Check valves in the lower elevations of PD-8 are installed near the boundaries of district PD-1 to maintain minimum system pressures in PD-8 during extreme conditions or during interruptions of supply from the higher districts.

2.6.5 Booster Stations

The City operates two major booster stations, the Huron Hill Booster Station at the WTP and the Wayne Hill Booster Station located adjacent to the Wayne Hill Storage Tank.

2.6.5.1 Huron Hills Booster Station

The Huron Hills Booster Station is located at the WTP and consists of three vertical turbine pumps that draw from the WTP storage reservoir. Backup power is provided by the 700 kW WTP generator. Two 720-gallon pressurized bladder tanks are installed on the pump discharge piping and are set to 100 psi.

This booster station feeds the southern portion of the Peninsula Township intermediate district including the Peninsula Booster Station that draws from the adjacent 0.3 mgal Peninsula Storage Tank. This station and tank are owned and operated by Peninsula Township. This tank has a 6-inch actuated valve that opens and closes to regulate the tank level and four pumps (one jockey, two larger pumps, and one large fire pump) that are used to boost the pressures to the upper-pressure district in Peninsula Township. A 2-inch hydraulically actuated valve is used to back feed from the upper district to PD-7 if the pressure falls below 40 psi. The 6-inch fill valve to the tank is controlled such that the 2-inch back feed valve does not open simultaneously and overflow the tank.

2.6.5.2 Wayne Hills Booster Station

The Wayne Hill reservoir and pump station were originally constructed in 1945. This 1.3 mgal reinforced concrete reservoir is maintained approximately 5-10 feet lower than the two Barlow Tanks of PD-1. Accordingly, the fill line contains an electrically actuated control valve to limit the tank from over-filling. The tank was originally constructed to provide additional fire flow storage for the western portion of PD-1. In the early 1960s, the reservoir fill valve vault was enlarged, and a building was constructed. Booster pumps were installed in the building on the suction side of the reservoir drain line to provide pressure to a relatively high portion of the northwestern section of the City that was too high to be served by PD-1. This initial upper-pressure district was also provided with a steel hydro-pneumatic storage tank including a compressor to provide some storage for this small pressure district.

In 2006, this district was expanded to the north to provide service to some additional areas within the City and neighboring Elmwood Township which were still too high to be serviced by the main pressure district (PD-1) but were lower than the initial area serviced by the Booster Pumps and hydropneumatics tank. Since these areas of the upper district were slightly lower, pressure reducing valves were provided to drop the pressure from the original Wayne Hill district down into the lower districts. This area is broken into three distinct pressure districts designated as PD-2, PD-3, and PD-4.

When the Wayne Hill District was first expanded, the original booster pumps and the hydro-pneumatic tank were demolished. The current pumping station includes a prefabricated skid-mounted pump station with three vertical multistage centrifugal booster pumps and two bladder tanks to provide a storage cushion between pump cycles. All the flow from the station is pumped to the pressure of PD-4 (HGL = 1000 feet) before splitting to the lower pressure districts. A pressure reducing valve down feeds a portion of the flow from PD-4 to PD-3 (HGL= 875 feet) within the station. PD-2 (HGL = 825 feet) is down-fed from PD-3 using remote PRVs located in the system. Backup power is provided by a 275-kW generator.

As part of the 2006 improvements, a 12-inch main was added along Wayne Street to provide a loop in this pressure district (now PD-4). This 12-inch main has been alleged to be causing some of the difficulties in the loss of pressure when hydrants are opened since water can more rapidly flow to the hydrant. The higher-pressure district service area (PD-4) supplied by this station experiences pressure issues at the highest elevations of Wayne Hill during hydrant openings that include temporary pressure drops in system pressure (to near atmospheric). To minimize the potential for these transient pressure issues, EGLE recommended that the City partially close many of the hydrant isolation gate valves to limit the hydrant flow in this service area.

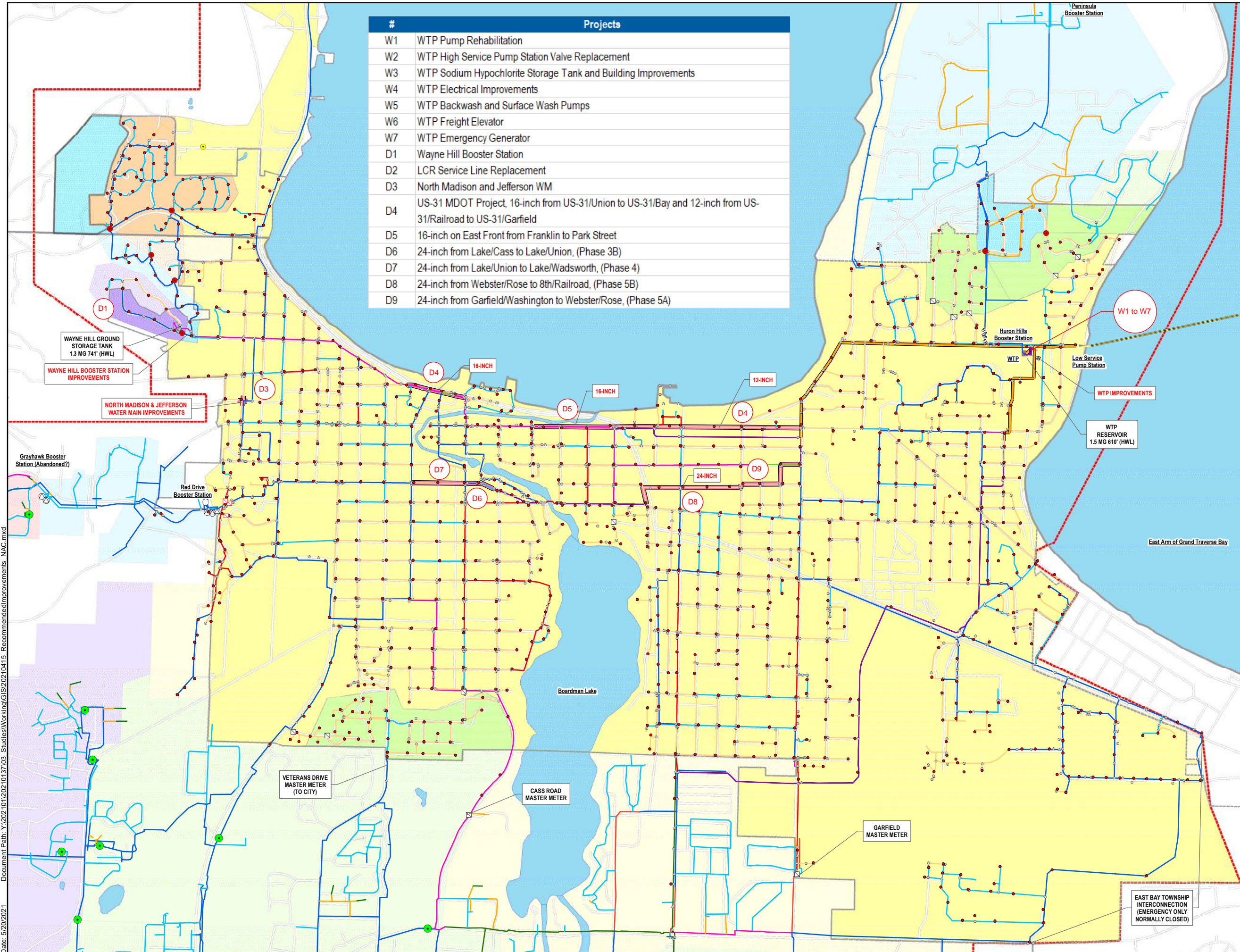
3 *Alternative Analysis*

3.1 *Alternatives Considered*

Each project was assessed to follow one of the following alternate classifications. Each upgrade or rehabilitative method was chosen on a technical basis and cost comparisons are presented for each alternative analysis, where applicable. Figure 3-1 shows the overall locations of these projects in the City and Figure 3-2 depicts the scope of work for the proposed projects at the WTP.

DRAFT

Document Path: Y:\2021\10\20210137\03 Studies\Working\GIS\2021\04\15 Recommended Improvements NAC.mxd
Date: 5/20/2021



#	Projects
W1	WTP Pump Rehabilitation
W2	WTP High Service Pump Station Valve Replacement
W3	WTP Sodium Hypochlorite Storage Tank and Building Improvements
W4	WTP Electrical Improvements
W5	WTP Backwash and Surface Wash Pumps
W6	WTP Freight Elevator
W7	WTP Emergency Generator
D1	Wayne Hill Booster Station
D2	LCR Service Line Replacement
D3	North Madison and Jefferson WM
D4	US-31 MDOT Project, 16-inch from US-31/Union to US-31/Bay and 12-inch from US-31/Railroad to US-31/Garfield
D5	16-inch on East Front from Franklin to Park Street
D6	24-inch from Lake/Cass to Lake/Union, (Phase 3B)
D7	24-inch from Lake/Union to Lake/Wadsworth, (Phase 4)
D8	24-inch from Webster/Rose to 8th/Railroad, (Phase 5B)
D9	24-inch from Garfield/Washington to Webster/Rose, (Phase 5A)

CITY of
TRAVERSE CITY MICHIGAN

HRC
HUBBELL, ROTH & CLARK, INC
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LEGEND

- Check Valve
- PRV
- Hydrant
- System Valve
- City/Township
- Water System Service Area
- County

Water Main

- 6"
- 8"
- 10"
- 12"
- 16"
- 18"
- 20"
- 24"
- 30"
- 36"

Pressure District HGL

- 750
- 751 - 825
- 826 - 884
- 885 - 999
- 1000 - 1090
- 1091 - 1200

Recommended Project

- Project Plan

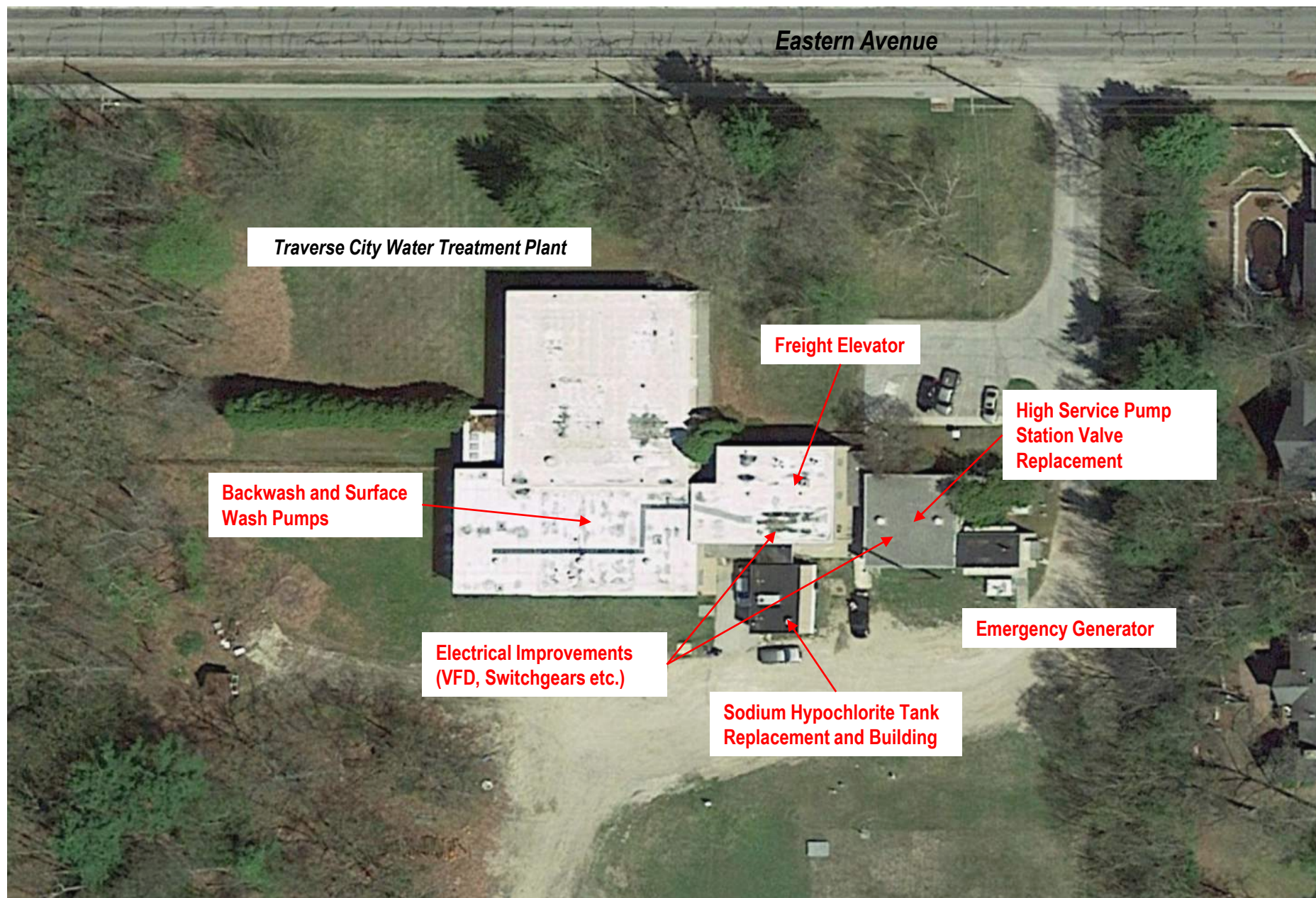
0 1,000 2,000 4,000 Feet

FIGURE 3.1
TRAVERSE CITY
RECOMMENDED IMPROVEMENTS

2021 DWSRF
PROJECT PLAN

MAY 2021

HRC #: 20210137



Traverse City – 2021 DWSRF Project Plan

Water Treatment Plant Proposed Improvements

Job No.
20210137

Date
May 2021

Figure No.
3.2

3.2 No Action

The “No-Action” alternative is not an option as it fails to meet the requirements of the Michigan Safe Drinking Water Act (MI-SDWA) and the mission and goals of the City to provide safe and clean water to its customers.

3.3 Water Treatment Plant Improvements

3.3.1 WTP Emergency Generator

This includes the construction of a new 750 kW generator for the WTP as well as an automatic transfer switch. Included in this construction are the concrete pads and site work associated with the new generator which will allow the WTP to provide additional capacity during a power outage.

3.3.2 WTP High Service Pump Station Valve Replacement

The four existing high service pump station control valves are cone valves with associated hydraulic controls that are experiencing mechanical failures due to the equipment age. The existing control valve for pump #5 is an actuated plug valve that is operating effectively. Four new control valves and isolation butterfly valves would be replaced with this project.

3.3.3 WTP Backwash and Surface Wash Pumps

The existing backwash pump provides backwashing capabilities for individually backwashing the filters. This pump needs to be rehabilitated which would include impeller replacement, seal replacement, refurbishing the motor, and other required improvements. The surface wash pump needs to be replaced and this work would include the installation of a new pump and isolation valves.

3.3.4 WTP Sodium Hypochlorite Storage Tank and Building Improvements

This project includes the replacement existing sodium hypochlorite storage tanks as well as the transfer pumps, piping, and fill lines. The existing fiberglass bulk storage tanks have reached the end of life and require frequent repairs. Leakage beneath the tank has caused damage to the concrete tank pads which increases the safety risks associated with sodium hypochlorite. Two new 8,100 gallon polyethylene tanks would be installed and the new concrete pads and floor would be coated with a high performance chemically resistant coating.

3.3.5 WTP Electrical Improvements

The existing VFDs at both the HSPS and LSPS variable frequency drives (VFDs) as well as the basement, high service pump station, and low service pump station electrical switchgears need to be replaced to ensure reliability for the operation and control of the WTP.

3.3.6 WTP Freight Elevator

The existing freight elevator at the WTP provides the ability to transport bulk items within the WTP main building. This project would include the replacement of the existing car and hydraulics.

3.3.7 WTP Pump Rehabilitation

This item includes the rehabilitation of four vertical turbine pumps at the LSPS and three vertical turbine pumps at the HSPS necessary to implement the electrical improvements that include VFD inverter duty rated motors.

3.4 Distribution System Improvements

3.4.1 LCR Service Line Replacement

Due to the changes implemented in June of 2018 to the Michigan Lead and Copper Rule (LCR) within the Safe Drinking Water Act 399 of 1976, the City of Traverse City is required to complete full water service line replacements where lead and galvanized water services exist from the existing water main or newly installed water main into the existing dwelling for each property regardless if the service line is on public or private property.

The changes to the LCR requirements effective in June of 2018 require communities to replace all lead and galvanized service lines at an average of 5-percent per year beginning in 2021, not to exceed 20 years, or in accordance with an alternative schedule incorporated into a drinking water asset management plan and approved by EGLE.

3.4.2 Water Main Construction

The evaluation of the existing water system capacity concludes that redundancy and reliability improvements are recommended to replace aging and undersized water mains through the following projects over the next five years.

1. 24-inch from Lake/Cass to Lake/Union (Installed in 1965, 8-inch and 12-inch cast iron)
2. 24-inch from Lake/Union to Lake/Wadsworth (Installed in 1965, 6-inch cast iron)
3. 24-inch from Webster/Rose to 8th/Railroad (Installed in 1954, 16-inch cast iron)
4. 16-inch from US-31/Union to US-31/Bay and 12-inch from US-31/Railroad to US-31/Garfield (Installed in 1950-1965, 18-inch cast iron)
5. 24-inch from Garfield/Washington to Webster/Rose (Installed in 1954-1964, 18-inch cast iron)
6. 16-inch on East Front from Franklin to Park Street (Installed in 1930, 18-inch cast iron)
7. North Madison and Jefferson Water Main

Additional projects to be completed as part of the City's capital improvements plan (beyond 5 years) include the following:

1. Construct approximately 12,200 feet of 16-inch and 24-inch main on Webster Street, 8th Street, Lake Street, 7th Street, and Spruce Street replacing the existing, older distribution main and providing redundancy of transmission to the west side of town.
2. Construction of a parallel 30-inch raw service water line from the LSPS to the WTP
3. Construction of 12-inch water main on Hannah Avenue from Bates to Garfield
4. Construction of 12-inch water main on Veterans Drive from 14th Street to Georgetown
5. Removal of the 12-inch water main across the Union Street Dam and replacing it with a new 12-inch main under the Boardman River just east of Union Street bridge by directional drilling with the Fish Pass Construction Project.

There is no practical alternative to accomplish the same outcome. Replacing and upsizing the above-mentioned distribution mains advances the proper resolution of the pressure and reliability problems throughout the distribution system. The occurrence of improved fire protection capabilities because of these water main replacements is a secondary benefit.

3.4.3 Wayne Hill Booster Station

Three options were considered to address the pumping capacity and suction issues at the booster station. They are as followed.

3.4.3.1 Option 1 – Install Three New Booster Pumps on the Lower Level

This option includes the replacement of the three pumps with one pump sized with the capability of providing the MDD and 3 pumps used for fire flow conditions. The pumps would be located on the lower level and would take suction from the existing reservoir suction line with their discharge connecting to the existing 8-inch discharge header from the skid-mounted pumps.

3.4.3.2 Option 2 – Relocate Existing Booster Pumps to Lower Level and Provide an Elevated Storage Tank

This option includes relocating the existing booster pumps to the lower level and a new suction header from the low-level reservoir suction line would be installed to connect to the pumps. One pump would provide the MDD and fire flow would be provided by the three pumps. Construction of a new elevated storage tank (150,000 gallons) in PD-3 would provide the required fire flows for the proposed commercial development in PD-3 as well as PD-2. Fire flow for PD-4 would continue to be provided solely by the pumps.

3.4.3.3 Option 3 – Supplemental Booster Pumps on Lower Level

It is also possible to address the current low NPSH problem by providing a booster pump at the elevation of the suction line from the reservoir. This booster pump would operate when the reservoir level at or below elevation 732'. This booster pump should be located so that the pump volute elevation is always at or below the lowest water surface in the reservoir. Adding a supplemental booster pump to push water against the existing prefabricated booster pump skid would enable the existing pumps on the skid to operate adequately under any condition of reservoir elevation and thus allow the full reservoir to be utilized during fires or other high demand periods. This pump would be sized to provide enough capacity for all three of the skid-mounted pumps to be utilized, if desired the increased head would increase the capacity of the three existing pumps and provide sufficient fire flow.

3.4.3.4 Selected Option

Based on the above analysis, Wayne Hill Booster Station Option 3 – Supplemental Booster Pumps is recommended but

3.5 Cost of Alternatives

The costs of the improvements detailed previously are shown in Table 3-1 by Fiscal Year.

Table 3-1. Summary of SRF Projects (by Fiscal Year)

Projects	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Water Treatment Plant					
WTP Pump Rehabilitation	\$224,000	\$224,000	\$112,000		
WTP High Service Pump Station Valve Replacement		\$427,000			
WTP Sodium Hypochlorite Storage Tank and Building Improvements		\$385,000			
WTP Electrical Improvements		\$1,597,000			
WTP Backwash and Surface Wash Pumps		\$172,000			
WTP Freight Elevator			\$300,000		
WTP Emergency Generator				\$589,000	
Distribution System					
Wayne Hill Booster Station	\$432,000				
LCR Service Line Replacement	\$399,000	\$399,000	\$399,000	\$399,000	\$399,000
North Madison and Jefferson WM		\$816,000			
US-31 MDOT Project, 16-inch from US-31/Union to US-31/Bay and 12-inch from US-31/Railroad to US-31/Garfield			\$1,983,000		
16-inch on East Front from Franklin to Park Street			\$1,079,000		
24-inch from Lake/Cass to Lake/Union, (Phase 3B)				\$488,000	
24-inch from Lake/Union to Lake/Wadsworth, (Phase 4)				\$807,000	
24-inch from Webster/Rose to 8 th /Railroad, (Phase 5B)					\$1,655,000
24-inch from Garfield./Washington to Webster/Rose, (Phase 5A)					\$1,465,000
Total FY Project Cost	\$1,055,000	\$4,020,000	\$3,873,000	\$2,283,000	\$3,519,000
Total Projects Cost	\$14,750,000				

3.6 Impacts of Alternatives

The recommended alternatives include improvements listed in the above projects which are a mixture of work at the Water Treatment Plant (WTP) and Distribution System. The long and short-term impacts of the alternatives are described in Section 5.

4 Selected Alternatives

4.1 Proposed Improvements

4.1.1 Proposed Water Treatment Plant Improvements

The following projects noted in Table 4-1 are the proposed WTP improvements under this Project Plan.

Table 4-1. Fiscal Year of WTP Projects

Project	Fiscal Year
WTP Pump Rehabilitation	2022-2024
WTP High Service Pump Station Valve Replacement	2023
WTP Sodium Hypochlorite Tank and Building Improvements	2023
WTP Electrical Improvements	2023
WTP Freight Elevator	2023
WTP Backwash and Surface Wash Pumps	2024
WTP Emergency Generator	2025

The design period of each project phase is estimated start in the year prior to the project fiscal year. The projects would be advertised and bid upon receipt of all the necessary permits. The general schedule would follow the consecutive phases, and specific, dates would be adjusted to meet the DWSRF Financing and Milestone Schedules adopted for each year of the project.

4.1.2 Proposed Distribution System Improvements

The following projects noted in Table 4-2 are the proposed distribution system improvements under this Project Plan.

Table 4-2. Fiscal Year of Distribution System Projects

Project	Fiscal Year
Wayne Hill Booster Station	2022
24-inch from Lake/Cass to Lake/Union, (Phase 3B)	2023
24-inch on Lake/Union to Lake/Wadsworth, (Phase 4)	2023
North Madison and Jefferson Watermain	2023
US-31 MDOT Project, 16-inch from US-31/Union to US-31/Bay and 12-inch from US-31/Railroad to US-31/Garfield	2024
16-inch on East Front from Franklin to Park Street	2024
24-inch from Webster/Rose to 8 th /Railroad, (Phase 5B)	2025
24-inch from Garfield/Washington to Webster/Rose, (Phase 5A)	2026
LCR Service Line Replacement	2022-2026

To address the current low NPSH problem new supplemental booster pumps are the recommended alternative for the Wayne Hill Improvements proposed work. This option would provide a booster pump at the elevation of the suction line from the reservoir and would operate when the reservoir level is at or below an elevation of 732 feet. Adding a supplemental booster pump would enable the existing pumps on the skid to operate adequately under any condition of reservoir elevation and thus allow the full reservoir to be utilized during fires or other high-demand periods.

The water main replacement projects could be designed and constructed as individual projects or combined into one phase of projects for each fiscal year. The City has an approximately 20% water loss in its system and much of the older cast iron mains are over 60 years old. These older pipes contribute to the risk of water reliability concerns and water mains breaks which can compromise system water quality. Areas of low flow due to smaller pipe size and reduced friction factors associated with older pipe can cause safety concerns from reduced fire flows. Implementing the water main replacements recommended in the 2020 Water System Reliability Study will address the reliability, quality, and safety concerns. The hydraulic modeling of the water system demonstrates that the new 16-inch and 24-inch water mains will improve system flows especially to maintain the storage levels of the Wayne Hill Reservoir.

4.2 Design Parameters

The proposed WTP improvements will be installed to meet the Michigan Safe Drinking Water Act 399 requirements as well as the City's design standards and Recommended Standards for WaterWorks (Ten States Standards).

The proposed water mains will be installed to meet the Act 399 requirements and the City of Traverse City design standards for water distribution system.

4.3 Water Main Installation and Materials

The installation methods for the water main replacement projects will primarily be completed using open cut methods. The site conditions may dictate other methods of replacement to accommodate the public and environment and

construction efficiencies. Open-cut methods will be implemented to coordinate with street paving activities. Horizontal directional drilling (HDD) may be used in applications with the appropriate clearances to underground utilities is provided and where there are limited service connections, tees, bends and other fittings along a particular length of main.

New water mains will be AWWA C151 ductile iron pipe, Thickness Class 52 or Pressure Class 250 or 350 in accordance the City's standards. If used, pipe installed by HDD methods would be AWWA C906 HDPE with a minimum DR11 wall thickness.

4.4 LCR Service Line Replacement

Due to the changes implemented in June of 2018 to the Michigan Lead and Copper Rule (LCR) within the Safe Drinking Water Act 399 of 1976, the City of Traverse City is required to complete full water service line replacements where lead and galvanized water services exist from the existing water main or newly installed water main into the existing dwelling for each property regardless if the service line is on public or private property. Based upon analysis of the water mains service lines required to be replaced as they are identified according to the EGLE guidance and regulations for the full replacement of the service line.

The changes to the LCR requirements effective in June of 2018 require communities to replace all lead and galvanized service lines at an average of 5-percent per year beginning in 2021, not to exceed 20 years, or in accordance with an alternative schedule incorporated into a drinking water asset management plan and approved by EGLE. The majority of the service lines in the City required to be replaced are galvanized.

4.5 Proposed Schedule

Table 4-3 below shows the completed Project Plan submittal task dates.

Table 4-3. Project Plan Task Schedule

Project Plan Task	Scheduled Date
Draft Project Plan to EGLE	May 5, 2021
Public Hearing Notice	May 20, 2021
Formal Public Hearing	June 21, 2021
City Commission Resolution of Project Plan Adoption	June 21, 2021
Submit Final Project Plan to EGLE	July 1, 2021

4.6 Cost Estimate

The estimated total project cost for the proposed SRF projects is \$14,750,000. Detailed cost estimates for the distribution system improvements and WTP improvements are both shown in Appendix E.

The City will be applying for Green Project Reserve credits as the water main projects represent Water Efficient Projects to replace aging water mains with high levels of leaks and breaks. The Business Cases are included in Appendix H. The estimated project costs do not incorporate any potential principal forgiveness the projects may be eligible for.

4.7 User Costs and Cost Sharing

The City of Traverse City Water Treatment Plant provides residential connections to City residents as well as residents from Elmwood, Garfield, and Peninsula Township. Table 4-4 denotes the number of residential connections for each that make up the total of 8,743 residential water connections.

Table 4-4. Residential Water Connections

Community	Residential Water Connections
City of Traverse City	5,870
Elmwood Township	46
Garfield Township	2273
Peninsula Township	554
Total	8,743

The estimated costs for all proposed projects and fiscal years are presented below. User charges are developed and adopted by the City annually and these charges vary based on:

1. Actual operational maintenance costs
2. Future increases in water pricing
3. Allocation of funding for future capital improvements and system replacement

Table 4-5 presents a summary of the estimated user costs by Fiscal year which were developed based on the estimated capital costs for the proposed project costs over the next five fiscal years. The entire debt retirement will be allocated based on the water consumed. Fixed charges and other non-flow related fees may be adjusted based on the results of the project. The annual equivalent costs for the project are provided below. The estimated cost per resident was allocated as the proportion of the project impact on the residential connections in the townships

Table 4-5. Estimated User Cost Summary by Phase

Descriptions	FY2022	FY2023	FY2024	FY2025	FY2026	Total
Total Phase Project Cost	\$1,055,000	\$4,020,000	\$3,873,000	\$2,283,000	\$3,519,000	\$14,750,000
Interest Rate	2.0%	2.0%	2.0%	2.0%	2.0%	
Term (years)	20	20	20	20	20	
No. of Residential Connections	8,743	8,743	8,743	8,743	8,743	
Total Annual Debt Repayment	\$64,600	\$245,900	\$236,900	\$139,700	\$215,300	\$902,400
Total Annual Debt Repayment, Residential*	\$41,925	\$159,589	\$153,748	\$90,665	\$139,730	\$585,658
Total Monthly Cost for Project per Residential Connection	\$0.40	\$1.52	\$1.47	\$0.86	\$1.33	\$5.58
Total Cost of Loan	\$1,292,000	\$4,918,000	\$4,738,000	\$2,794,000	\$4,306,000	\$18,048,000
Interest Paid	\$237,000	\$898,000	\$865,000	\$511,000	\$787,000	\$3,298,000

*Notes:

1. Assumes interest rate of 2.0%, pricing in 2021 dollars with 30% contingency
2. Assumes 65% residential contribution to fund (estimated per water billing records)
3. As of April 2021, 5,870 residential connections in Traverse City and 2,873 residential connections from Townships

4.8 Authority to Implement Selected Alternative

Implementation of the proposed project assumes that the project will be financed by a low-interest loan from the SRF program. The City of Traverse City has the necessary legal, institutional, financial, and managerial resources available to ensure the construction, operation, and maintenance of the proposed facilities.

Most of the water main replacements will occur in the City road right-of-way but portions of the proposed project will occur in the road right-of-way under the jurisdiction of the Michigan Department of Transportation (MDOT). MDOT jurisdiction includes US-31 and during the construction plan development the necessary MDOT permits will be acquired.

5 Environmental Impacts

5.1 General

The anticipated environmental impacts resulting from the construction of the selected plan include beneficial & adverse, short term & long term, and irreversible impacts. The following is a discussion of the environmental impacts of the selected plan.

5.1.1 Beneficial and Adverse Impacts

The WTP is the City of Traverse City's drinking water treatment facility. The WTP provides drinking water to all commercial and domestic (residential) residents. Drinking water to homes and businesses is conveyed from the WTP after being treated from the City's raw water supply from an intake structure from the east arm of Grand Traverse Bay (East Bay). Without the diligent work of WTP employees to operate and maintain the facilities, the clean water would not be distributed throughout the City and associated townships.

Construction activities associated with the proposed WTP improvements and Drinking Water Distribution System improvements will take place on the existing facilities. Construction and equipment manufacturing related jobs would be generated, and local contractors would have an equal opportunity to bid on the construction contracts.

The environmental impacts for each alternative are expected to be minimal to none. All elements of improvement efforts in this project aim to have the least impact possible on the community and environment. No long-lasting impacts are expected for any alternative. Implementation of the Project Plan would create temporary disruption due to required construction. This includes noise and dust generated by the work and possible erosion of soils from open excavation. The assessment of alternate solutions and sites for the proposed project included identification of any important resources of either historic or environmental value which are protected by law and should be avoided.

No registered contamination sites were found within the WTP projects using the EGLE site contamination online mapper tool. One site may be impacted with the construction of water main on East Front Street. Documentation of the research of the can be found in Appendix F.

5.1.2 Short-Term and Long-Term Impacts

The short-term adverse impacts associated with construction activities would be minimal, and mitigatable, in comparison to the resulting long-term beneficial impacts. Impacts from the Drinking Water Distribution System and WTP improvements include temporary site disturbance, temporary damage to surface vegetation, and temporary water shut-off for residents. All restoration required post-replacement should return the impacted area to existing conditions. No long-term negative impacts are anticipated.

The long-term positive impacts include upgrading failing infrastructure, compliance with MI-SDWA, improved efficiency at the plant, and the ability to continue providing adequate clean water throughout the City and associated townships. These impacts also include improved processing at the plant and reduced wear on the plant equipment.

5.1.3 Irreversible Impacts

The investment in non-recoverable resources committed to the Project Plan would be traded off for the improved performance of the facilities during the life of the system. The commitment of resources includes public capital,

energy, labor, and unsalvageable materials. These non-recoverable resources would be foregone for the provision of the proposed improvements.

Construction accidents associated with this project may cause irreversible bodily injuries or death. Accidents may also cause damage to or destruction of equipment and other resources.

5.2 Analysis of Impacts

5.2.1 Direct Impacts

Local Air Quality

There will be minimal direct impacts on local air quality during the construction phases of these projects. Any effects on air quality will be due to dust and emissions from construction equipment.

Archeological, Historical, or Cultural Resources

There are no impacts on archaeological, tribal, historical, or cultural resources due to this project. However, the appropriate affiliates will be contacted and informed about the project upon any changes in conditions.

Impacts Upon the Existing or Future Quality of Local Groundwater and Surface Waters

Construction will occur of the WTP site as well as throughout the Drinking Water Distribution System. No impact will be made to Grand Traverse Bay and surrounding waterways, but appropriate measures will be taken during construction to avoid impact to these neighboring bodies of water. All necessary permits will be obtained before the proposed activities. There are no impacts anticipated to the local groundwater.

Impacts Upon Sensitive Features

Since the work is expected to take place within the existing Drinking Water Distribution System and WTP facilities, the construction will take place outside of the designated floodplain, wetland areas, or other sensitive areas. Any work that takes place within floodplain limits, proper mitigation measures, and permits will be obtained before the proposed activities.

Impacts Upon People and The Local Economy

Short-term impacts on people will occur during the construction phase. Increased construction traffic will occur in the localized area of the WTP. The City of Traverse City and associated townships water users will experience beneficial long-term impacts due to the level of service to which they expect to be maintained by these improvements.

The local economy will be stimulated for contractors and suppliers of the materials, labor, and equipment necessary to construct the project.

Operational Impacts

The proposed projects will improve the operation efficiency of the WTP and lower future operation and maintenance (O&M) costs for the Drinking Water Distribution System.

5.2.1 Indirect Impacts

Changes in Rate, Density, Or Type of Residential, Commercial, or Industrial Development and the Associated Transportation Changes

No changes are anticipated to the above.

Changes in Land Use

No changes are anticipated to the above. All improvements to the WTP and the Drinking Water Distribution System will be completed on the existing WTP site and existing system facilities.

Changes in Air or Water Quality Due to Facilitated Development

There will be no changes to air quality due to development.

Changes to The Natural Setting or Sensitive Features Resulting from Secondary Growth

There should be no changes to the natural setting or sensitive features resulting from secondary growth.

Impacts on Cultural, Human, Social and Economic Resources

No changes are anticipated to the above.

Impacts of Area Aesthetics

All the proposed WTP work will be completed on the existing site which is largely isolated from public view and the Drinking Water Distribution System will be completed on existing structures which are mainly underground.

Resource Consumption Over the Useful Life of the Treatment Works, Especially the Generation of Solid Wastes

No changes are anticipated to the above.

5.2.1 Cumulative Impacts

Siltation

Siltation may occur during the construction phase of the project. Proper soil erosion and sedimentation control practices will be followed to reduce the impacts of siltation on surrounding areas.

Water Quality Impacts from Direct Discharges and Non-Point Sources

There should not be any impacts to the above as a result of this project.

Indirect Impacts from Development

There should not be development as a result of this project.

The Impacts from Multiple Public Works Projects Occurring in the Same Vicinity

There will only be short-term traffic impacts during the construction phase of this project and proper traffic control measures will be followed.

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6 Mitigation

6.1 Short-Term, Construction Related Mitigation

Environmental disruption will occur during construction. Guidelines will be established for cover vegetation removal, dust control, traffic control and accident prevention. Once construction is completed those short-term effects will stop and the area will be returned to the original conditions.

The soil erosion impact would be mitigated through the contractor's required compliance with a program for control of soil erosion and sedimentation as specified in Part 91 of Michigan Act 451, P.A. of 1994. The use of soil erosion and sedimentation controls (i.e., straw bales, sedimentation basins, catch basin inserts, silt fencing, etc.) will protect the Boardman River, Boardman Lake, Kids Creek, and the Grand Traverse Bay.

Careful considerations will be taken during the construction planning process to ensure that the plant remains in service while the improvements are underway. Construction equipment will be maintained in good condition to decrease noise. All access roads will be swept as necessary to avoid tracking sediment onto public roads.

6.2 Mitigation of Long-Term Impacts

General construction activities will prohibit the disposal of soils in wetlands, floodplains, or other sensitive areas. Catch basins will be protected where earth-changing activities will take place.

6.3 Mitigation of Indirect Impacts

The current trend in Grand Traverse County and the City of Traverse City is that the land use is largely dominated by residential properties. According to the City of Traverse City's master planning for land use, this will not change. Considering that a vast majority of the residents within the City limits are connected to the water system, a substantial increase in flow is not expected from within the City limits.

The City of Traverse City's Master Plan and ordinances can also be found on their websites.

7 Public Participation

7.1 General

The Project Plan will be advertised in the local newspaper before May 20, 2021 (refer to Appendix G for all public participation documentation.) A copy of the Project Plan will be placed at the following location for review:

- City Hall
- Online at the City of Traverse City's Website

A formal public hearing will be held on June 21, 2021 to review the work associated with the proposed Project Plan. The hearing will review the information presented in the Project Plan, including estimated user costs and to receive comments and views of interested persons. Copies of correspondence related to agency notifications, as well as other relevant correspondence, will also be included in Appendix G.

7.2 Public Hearing

Appendix G will include a transcribed copy of the public hearing, commission members attendance list, the Project Plan resolution, comments received and answered, and a photocopy of the slides presented at the hearing.

7.3 Resolution

The City Commission made a formal resolution regarding this Plan at a Commission meeting following the public hearing scheduled for June 21, 2021. The resolution is included in Appendix G.

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Nationwide Rivers Inventory

This is a listing of more than 3,200 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" values.

National Park Service
U.S. Department of the Interior



FIGURE 1
NATIONWIDE RIVERS
INVENTORY

2021 DWSRF
PROJECT PLAN



FIGURE 1
NATIONAL WILD AND SCENIC
RIVERS MAP

2021 DWSRF
PROJECT PLAN

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Search

Area of Interest

Open All Close All

AOI Properties

Clear AOI ?

AOI Information

Name

Map Unit Symbols
☒ Use Soil Survey Area Map Unit Symbols
☐ Use National Map Unit Symbols

Area (acres) 282.3

Soil Data Available from Web Soil Survey

Grand Traverse County, Michigan (MI055)

Data Availability Tabular and Spatial, complete

Tabular Data Version 14, Jun 8, 2020

Spatial Data Version 7, Jun 8, 2020

Clear AOI

Import AOI

Export AOI

Quick Navigation

Address

State and County

Soil Survey Area

Latitude and Longitude or Current Location

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

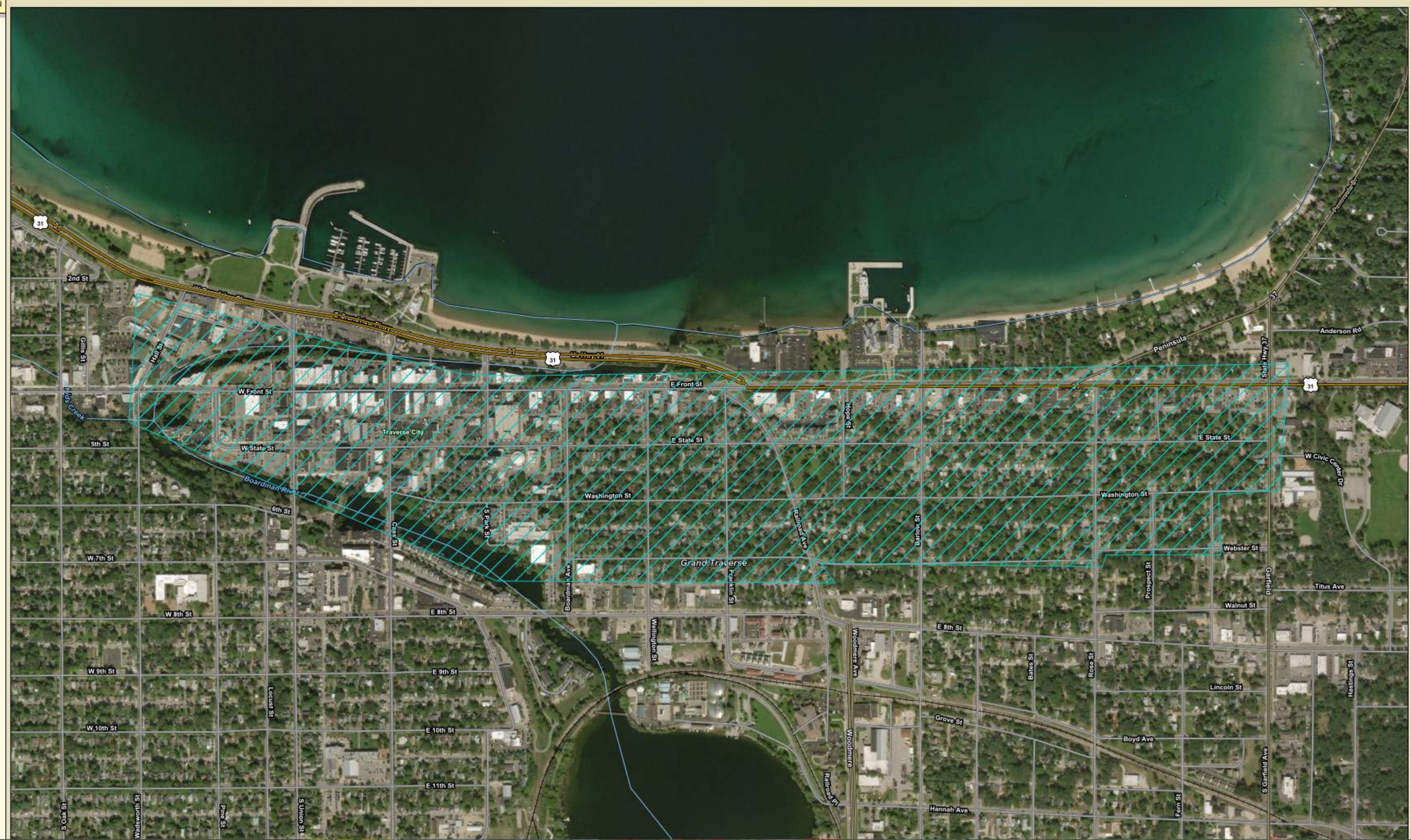
Legend

Area of Interest Interactive Map



























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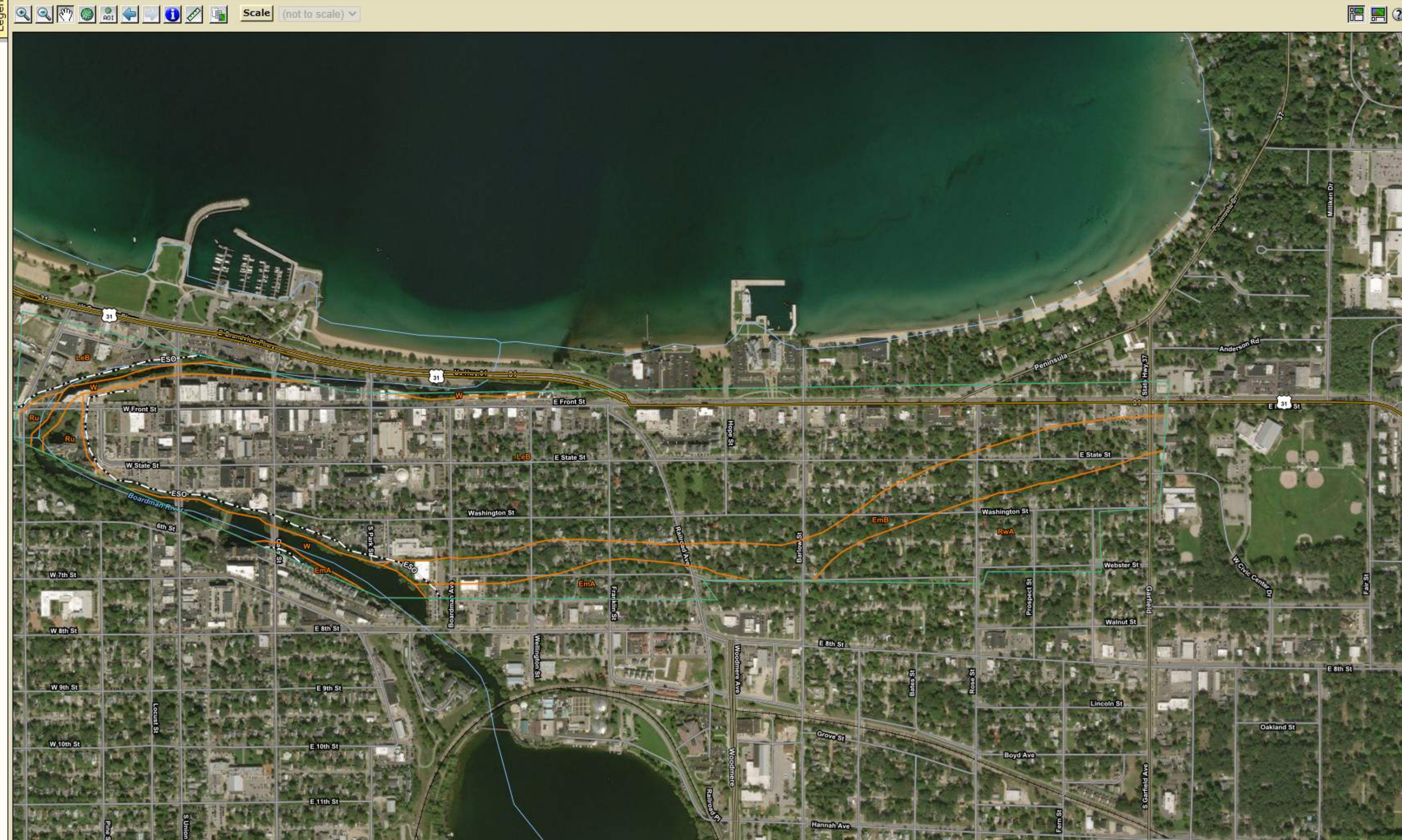
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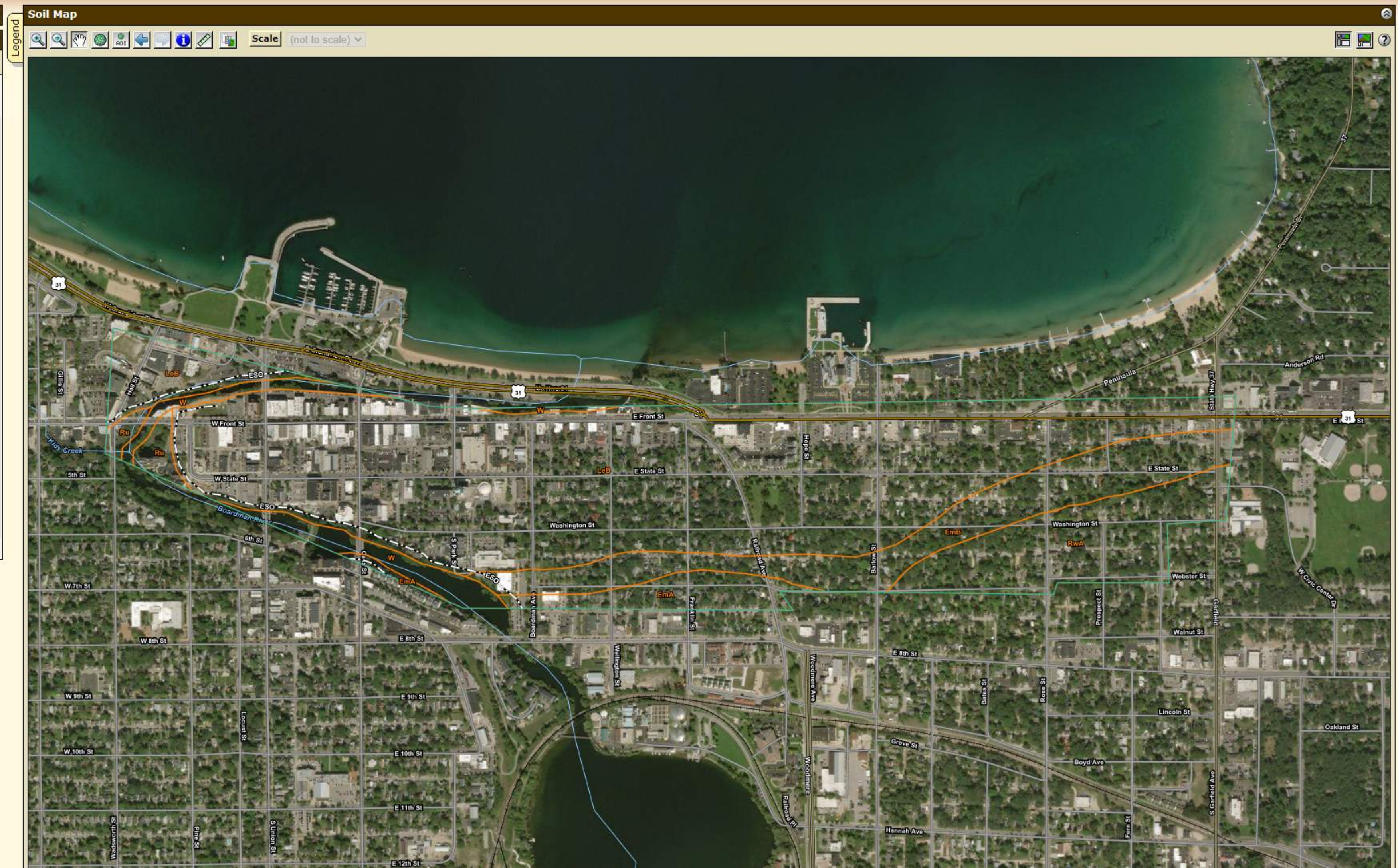
Soil Map

Legend

Building Site Development	 
Construction Materials	 
Disaster Recovery Planning	 
Land Classifications	 
Land Management	 
Military Operations	 
Recreational Development	 
Sanitary Facilities	 
Soil Health	 
Vegetative Productivity	 
Waste Management	 
Water Management	 



Search			
Map Unit Legend			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EmA	East Lake-Mancelona loamy sands, 0 to 2 percent slopes	11.4	4.0%
EmB	East Lake-Mancelona loamy sands, 2 to 6 percent slopes	36.7	13.0%
LeB	Lake beach and Eastport sand, 0 to 6 percent slopes	187.7	66.5%
Ru	Roscommon mucky loamy sand	4.3	1.5%
RwA	Rubicon sand, 0 to 2 percent slopes	29.8	10.6%
W	Water	12.3	4.4%
Totals for Area of Interest		282.3	100.0%



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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443
<http://www.fws.gov/midwest/EastLansing/>

In Reply Refer To:

May 05, 2021

Consultation Code: 03E16000-2021-SLI-1367

Event Code: 03E16000-2021-E-05011

Project Name: Traverse City DWSRF

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies any federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are several important steps in evaluating the effects of a project on listed species. Please use the species list provided and visit the U.S. Fish and Wildlife Service's Region 3 Section 7 Technical Assistance website at <http://www.fws.gov/midwest/endangered/section7/s7process/index.html>. This website contains step-by-step instructions to help you determine if your project may affect listed species and lead you through the section 7 consultation process.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the ECOS-IPaC website (<http://ecos.fws.gov/ipac/>) at regular intervals during project planning and implementation and completing the same process you used to receive the attached list.

For all **wind energy projects** and **projects that include installing towers that use guy wires or are over 200 feet in height**, please contact this field office directly for assistance, even if no federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibitions include the take and disturbance of eagles. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/midwest/eagle/permits/index.html> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/birds/policies-and-regulations/administrative-orders/executive-orders.php>.

We appreciate your concern for threatened and endangered species. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5664.pdf	Threatened

Birds

NAME	STATUS
Red Knot <i>Calidris canutus rufa</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> ▪ Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none">▪ For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5280.pdf	Threatened

Flowering Plants

NAME	STATUS
Pitcher's Thistle <i>Cirsium pitcheri</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8153	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Cape May Warbler <i>Setophaga tigrina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Jul 31
Dunlin <i>Calidris alpina arcticola</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden Eagle <i>Aquila chrysaetos</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Harris's Sparrow <i>Zonotrichia querula</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Least Bittern <i>Ixobrychus exilis</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6175	Breeds Aug 16 to Oct 31
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Olive-sided Flycatcher <i>Contopus cooperi</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone <i>Arenaria interpres morinella</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

NAME	BREEDING SEASON
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Jul 20
Semipalmated Sandpiper <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Whimbrel <i>Numenius phaeopus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

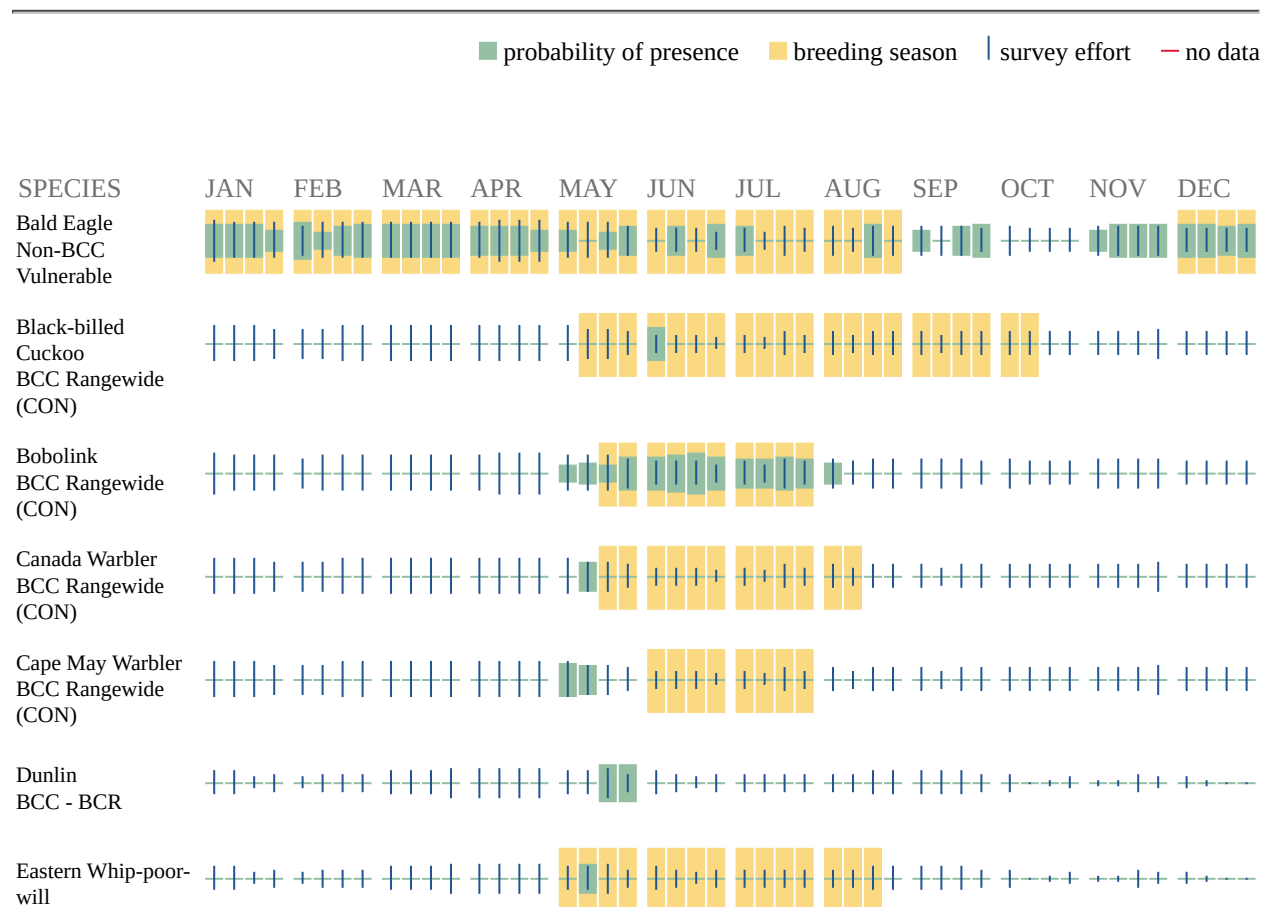
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

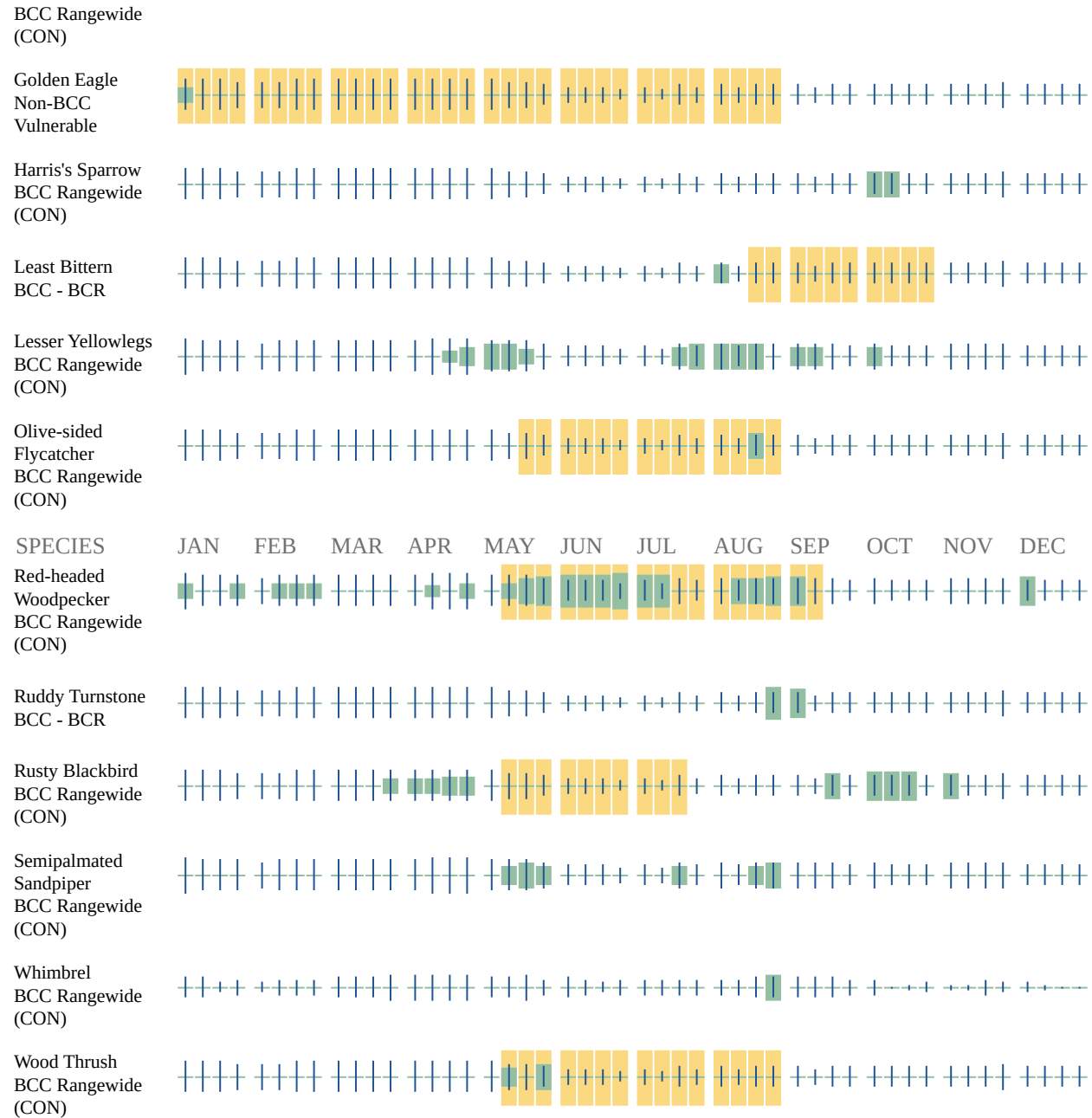
No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your

project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no

data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE

- [L1UBHh](#)

RIVERINE

- [R5UBH](#)
 - [R2UBH](#)
-

DRAFT



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1925 Breton Road SE, Suite 100; Grand Rapids, MI 49506

Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP Pump Rehabilitation

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Pump Rehabilitation	5	EA	\$80,000	\$400,000
	Construction Subtotal				\$400,000
	Contingencies	20	%		\$80,000
	Engineering, Legal, and Administrative	20	%		\$80,000
	TOTAL PROJECT COST				\$560,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP High Service Pump Station Valve Replacement

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	14-inch Plug Valve (100% Port)	3	EA	\$15,000	\$45,000
2	12-inch Plug Valve (100% Port)	1	EA	\$12,000	\$12,000
3	Electro-Pneumatic Actuators	4	EA	\$20,000	\$80,000
4	14-inch Butterfly Valve	3	EA	\$12,000	\$36,000
5	12-inch Butterfly Valve	1	EA	\$10,000	\$10,000
6	Equipment Installation	40	%	\$183,000	\$73,200
7	Misc Metal	1	%	\$256,200	\$2,562
8	Misc Mechanical	1	%	\$256,200	\$2,562
9	Misc Painting	1	%	\$256,200	\$2,562
10	Electrical and SCADA Allowance	25	%	\$80,000	\$20,000
	Construction Subtotal				\$284,000
	Contingencies	30	%		\$86,000
	Engineering, Legal, and Administrative	20	%		\$57,000
	TOTAL PROJECT COST				\$427,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP Sodium Hypochlorite Storage Tank and Building Improvements

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Demo Existing Wall	1	LS	\$10,000	\$10,000
2	New 15' x 15' FRP Panel Wall	225	SF	\$100	\$22,500
3	Wall Header and Jams	1	LS	\$25,000	\$25,000
4	8100 Gallon Polyethylene Tank	2	EA	\$25,000	\$50,000
5	Level Transducers	2	EA	\$2,000	\$4,000
6	Transfer Pumps	2	EA	\$10,000	\$20,000
7	Chemical Resistant Coating	1200	SF	\$25	\$30,000
8	Concrete Surface Repairs	200	SF	\$50	\$10,000
9	4" Fill Piping	50	LF	\$40	\$2,000
10	4" Ball Valves	2	EA	\$1,000	\$2,000
11	4" Camlock Fittings	2	EA	\$500	\$1,000
12	Equipment Installation	40	%	\$176,500	\$70,600
13	Misc Metal	1	%	\$247,100	\$2,471
14	Misc Mechanical	1	%	\$247,100	\$2,471
15	Misc Painting	1	%	\$247,100	\$2,471
16	Electrical and SCADA Allowance	25	%	\$4,000	\$1,000
	Construction Subtotal				\$256,000
	Contingencies	30	%		\$77,000
	Engineering, Legal, and Administrative	20	%		\$52,000
	TOTAL PROJECT COST				\$385,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP Electrical Improvements

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Install VFDs on HSPS Pumps 2 and 4	2	EA	\$50,000	\$100,000
2	Install VFDs on LSPS Pumps 1, 2, and 4	3	EA	\$35,000	\$105,000
3	Replace Basement Switchgear	1	LS	\$80,000	\$80,000
4	Replace High Service Pump Station Switchgear	1	LS	\$250,000	\$250,000
4	Replace Low Service Pump Station Switchgear	1	LS	\$250,000	\$250,000
5	Equipment Installation	15	%	\$785,000	\$117,750
6	Misc Metal	1	%	\$902,750	\$9,028
7	Misc Mechanical	1	%	\$902,750	\$9,028
8	Misc Painting	1	%	\$902,750	\$9,028
9	Electrical and SCADA Allowance	25	%	\$535,000	\$133,750
	Construction Subtotal				\$1,064,000
	Contingencies	30	%		\$320,000
	Engineering, Legal, and Administrative	20	%		\$213,000
	TOTAL PROJECT COST				\$1,597,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP Backwash and Surface Wash Pumps

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
Surface Wash Pump					
1	New Surface Wash Pump	1	EA	\$25,000	\$25,000
2	4" Gate Valves	2	EA	\$3,000	\$6,000
3	Equipment Installation	100	%	\$31,000	\$31,000
4	Misc Metal	1	%	\$62,000	\$620
5	Misc Mechanical	1	%	\$62,000	\$620
6	Misc Painting	1	%	\$62,000	\$620
Backwash Pump					
7	Rehab Backwash Pump	1	EA	\$50,000	\$50,000
	Construction Subtotal				\$114,000
	Contingencies	30	%		\$35,000
	Engineering, Legal, and Administrative	20	%		\$23,000
	TOTAL PROJECT COST				\$172,000



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PROJECT: **Traverse City DWSRF**

LOCATION: **Traverse City, Michigan**

WORK: **WTP Freight Elevator**

DATE: **5/1/2021**

PROJECT NO. **20210137**

ESTIMATOR: **ARH**

CHECKED BY: **DIU**

CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Car and Hydraulics	1	LS	\$200,000	\$200,000
	Construction Subtotal				\$200,000
	Contingencies	30	%		\$60,000
	Engineering, Legal, and Administrative	20	%		\$40,000
	TOTAL PROJECT COST				\$300,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: WTP Emergency Generator

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 750 kW Generator	1	LS	\$265,000	\$265,000
2	Generator Switchgear for New Generator and ATS	1	LS	\$25,000	\$25,000
3	Concrete Pad and Sitework	1	LS	\$20,000	\$20,000
4	Equipment Installation	1	LS	\$10,000	\$10,000
5	Misc Metal	1	%	\$320,000	\$3,200
6	Misc Mechanical	1	%	\$320,000	\$3,200
7	Misc Painting	0.5	%	\$320,000	\$1,600
8	Electrical and SCADA Allowance	20	%	\$320,000	\$64,000
	Construction Subtotal				\$392,000
	Contingencies	30	%		\$118,000
	Engineering, Legal, and Administrative	20	%		\$79,000
	TOTAL PROJECT COST				\$589,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: Lead and Galvanized Service Line Replacement

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Replacement of lead service lines	300	LEAD	\$6,650	\$1,995,000
	Construction Subtotal				\$1,995,000
	Contingencies	0	%		\$0
	Engineering, Legal, and Administrative	0	%		\$0
	TOTAL PROJECT COST				\$1,995,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: Wayne Hill Booster Station

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Excavate for New Suction Line	26	CY	\$1,000	\$26,000
2	Live Tap 12-inch Line (TS&V)	1	LS	\$2,000	\$2,000
3	12-inch Suction Line	20	LF	\$400	\$8,000
4	Core thru PS Wall	2	EA	\$800	\$1,600
5	Sawcut Floor	20	LF	\$60	\$1,200
6	Excavate for Discharge Line (Hand)	5	CY	\$2,000	\$10,000
7	New Supplemental Booster Pumps	2	EA	\$39,000	\$78,000
8	Discharge Header 10-inch	24	LF	\$300	\$7,200
9	Discharge Pipe Fittings 10-inch	6	EA	\$1,000	\$6,000
10	Lifting Eyes for Motor & Pump	2	EA	\$600	\$1,200
11	New Genset	0	LS	\$150,000	\$0
12	New Supplemental Pump Starters	2	EA	\$25,000	\$50,000
13	Reprogramming Control Scheme	1	LS	\$20,000	\$20,000
14	New 726 Gallon Bladder Tank	1	LS	\$10,000	\$10,000
15	Wayne Hill 8-inch Combination Pressure Sustaining/Reducing Valve	1	EA	\$20,000	\$20,000
16	Misc Metal	1	%	\$241,200	\$2,500
17	Misc Mechanical	1	%	\$241,200	\$3,000
18	Misc Painting	1	%	\$241,200	\$2,500
19	Electrical Allowance	15	%	\$241,200	\$37,000
	Construction Subtotal				\$287,000
	Contingencies	30	%		\$87,000
	Engineering, Legal, and Administrative	20	%		\$58,000
	TOTAL PROJECT COST				\$432,000



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PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: North Madison and Jefferson Watermain

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	N Madison St (W Front St to Wayne St) 8"	1875	FT	\$250	\$468,750
2	Jefferson St (City Limits to N Elmwood Ave) 8"	630	FT	\$250	\$157,500
	Construction Subtotal				\$627,000
	Contingencies	20	%		\$126,000
	Engineering, Legal, and Administrative	10	%		\$63,000
	TOTAL PROJECT COST				\$816,000



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PROJECT: Traverse City DWSRF

DATE: 5/1/2021

LOCATION: Traverse City, Michigan

PROJECT NO. 20210137

WORK: US-31 MDOT Project, 16-inch from US-31/Union to US-31/Bay
and 12-inch from US-31/Railroad to US-31/Garfield

ESTIMATOR: ARH

CHECKED BY: DIU

CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Garfield Ave to Railroad Ave - 12" Water Main Upgrade	4100	Ft	\$195	\$799,500
2	Cass St to Union St - 8" Water Main Upgrade	800	Ft	\$180	\$144,000
3	Union St to US-31 ROW & Bay St projected - 16" Water Main Upgrade	1370	Ft	\$275	\$376,750
	Construction Subtotal				\$1,321,000
	Contingencies	30	%		\$397,000
	Engineering, Legal, and Administrative	20	%		\$265,000
	TOTAL PROJECT COST				\$1,983,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: 16-inch on East Front from Franklin to Park Street

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 16-inch Water Main (RJ,CL 52, DIP, 5' Cover)	1800	LF	\$150	\$270,000
2	Hydrants	4	EA	\$5,000	\$20,000
3	16-inch Gate Valve and Box (1 every 500 ft)	5	EA	\$15,000	\$69,000
4	Water Service Connection	42	EA	\$5,000	\$210,000
5	Connection to Existing Main	5	EA	\$10,000	\$50,000
6	Pavement Replacement	1800	LF	\$50	\$90,000
7	Traffic Control	1	LS	\$10,000	\$10,000
	Construction Subtotal				\$719,000
	Contingencies	30	%		\$216,000
	Engineering, Legal, and Administrative	20	%		\$144,000
	TOTAL PROJECT COST				\$1,079,000



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Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: 24-inch from Lake Cass/Union to Lake/Union, (Phase 3B)

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 24 inch Water Main (RJ, CL 52, DIP, 5' Cover)	664	LF	\$250	\$166,000
2	Hydrants (1 every 350 ft)	3	EA	\$5,000	\$15,000
3	24-inch Gate Valve and Box (1 every 500 ft)	2	EA	\$20,000	\$40,000
4	Water Service Connection	2	EA	\$5,000	\$10,000
5	Connection to Existing Main	5	EA	\$10,000	\$50,000
6	Pavement Replacement	664	LF	\$50	\$33,200
7	Traffic Control	1	LS	\$10,000	\$10,000
	Construction Subtotal				\$325,000
	Contingencies	30	%		\$98,000
	Engineering, Legal, and Administrative	20	%		\$65,000
	TOTAL PROJECT COST				\$488,000



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PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: 24-inch on Lake/Union to Lake/Wadsworth, (Phase 4)

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR: _____

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 24-inch Water Main (RJ, CL 52, DIP, 5' Cover)	1190	LF	\$250	\$297,500
2	Hydrants (1 every 350 ft)	4	EA	\$5,000	\$20,000
3	24-inch Gate Valve and Box (1 every 500 ft)	3	EA	\$20,000	\$60,000
4	Water Service Connection	8	EA	\$5,000	\$40,000
5	Connection to Existing Main	5	EA	\$10,000	\$50,000
6	Pavement Replacement	1190	LF	\$50	\$59,500
7	Traffic Control	1	LS	\$10,000	\$10,000
	Construction Subtotal				\$537,000
	Contingencies	30	%		\$162,000
	Engineering, Legal, and Administrative	20	%		\$108,000
	TOTAL PROJECT COST				\$807,000



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1925 Breton Road SE, Suite 100; Grand Rapids, MI 49506

Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: 24-inch from Webster/Rose to 8th/Railroad, (Phase 5B)

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 24-inch Water Main (RJ, CL 52, DIP, 5' Cover)	2610	LF	\$250	\$652,500
2	Hydrants (1 every 350 ft)	8	EA	\$5,000	\$40,000
3	24-inch Gate Valve and Box (1 every 500 ft)	6	EA	\$20,000	\$120,000
4	Water Service Connection	20	EA	\$5,000	\$100,000
5	Connection to Existing Main	5	EA	\$10,000	\$50,000
6	Pavement Replacement	2610	LF	\$50	\$130,500
7	Traffic Control	1	LS	\$10,000	\$10,000
	Construction Subtotal				\$1,103,000
	Contingencies	30	%		\$331,000
	Engineering, Legal, and Administrative	20	%		\$221,000
	TOTAL PROJECT COST				\$1,655,000



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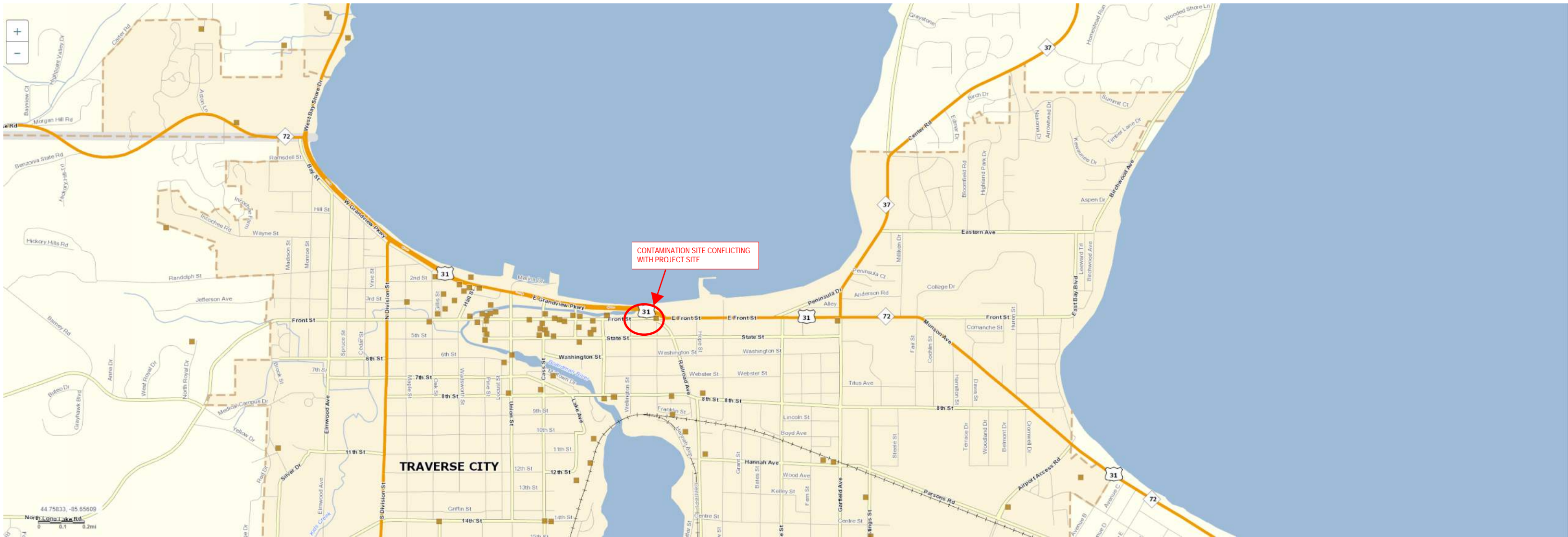
Telephone: (616) 454-4286

PROJECT: Traverse City DWSRF
LOCATION: Traverse City, Michigan
WORK: 24-inch from Garfield/Washington to Webster/Rose, (Phase 5A)

DATE: 5/1/2021
PROJECT NO. 20210137
ESTIMATOR: ARH
CHECKED BY: DIU
CURRENT ENR:

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	New 24-inch Water Main (RJ, CL 52, DIP, 5' Cover)	1720	LF	\$250	\$430,000
2	Hydrants (1 every 350 ft)	6	EA	\$5,000	\$30,000
3	24-inch Gate Valve and Box (1 every 500 ft)	5	EA	\$20,000	\$100,000
4	Water Service Connection	40	EA	\$5,000	\$200,000
5	Connection to Existing Main	12	EA	\$10,000	\$120,000
6	Pavement Replacement	1720	LF	\$50	\$86,000
7	Traffic Control	1	LS	\$10,000	\$10,000
	Construction Subtotal				\$976,000
	Contingencies	30	%		\$293,000
	Engineering, Legal, and Administrative	20	%		\$196,000
	TOTAL PROJECT COST				\$1,465,000

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CITY of
TRAVERSE CITY MICHIGAN

WATER RELIABILITY STUDY

WSSN #6440



PREPARED BY:

FEBRUARY 2021



HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

**1925 Breton Road SE, Suite 100
Grand Rapids, Michigan 49506**

HRC Job Number 20200232